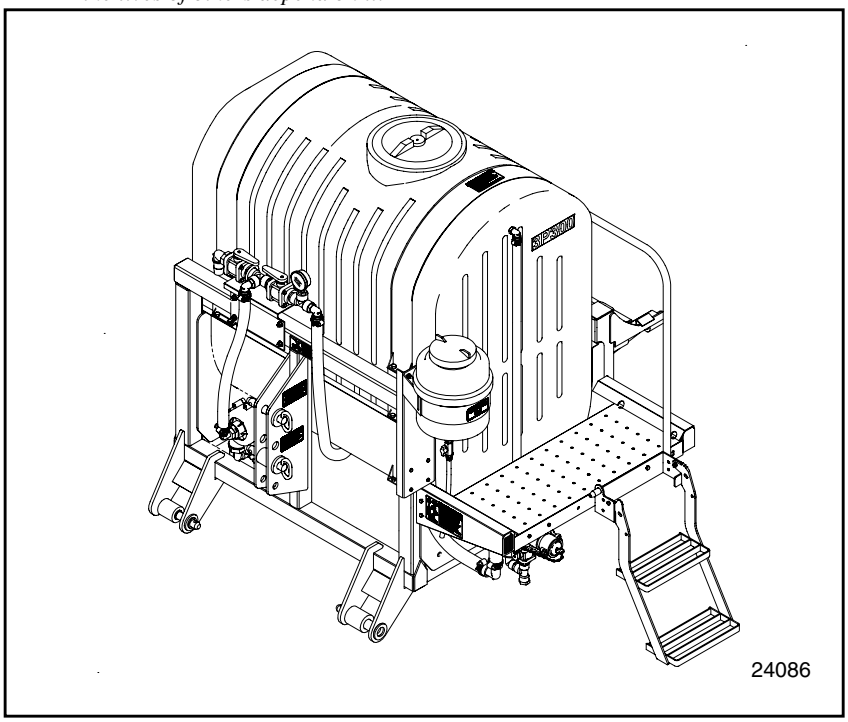
Operator Manual

3P300
SN HH1113+

Three-Point Sprayer

Great Plains
Manufacturing, Inc.
www.greatplainsmfg.com

Read the operator's manual entirely. When you see this symbol, the subsequent instructions and warnings are serious - follow without exception. Your life and the lives of others depend on it!



Cover illustration may show optional equipment not supplied with standard unit.

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Table of Contents

Printed in the United States of America.

Table of Contents

Important Safety Information

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

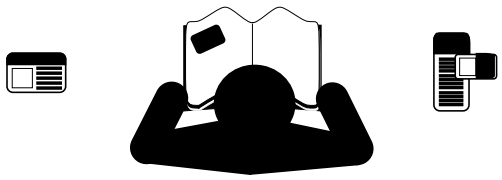
CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Prepare for Emergencies

- ▲ *Be prepared if a fire starts*
- ▲ *Keep a first aid kit and fire extinguisher handy.*
- ▲ *Keep emergency numbers for doctor, ambulance, hospital and fire department near phone.*

Be Familiar with Safety Decals

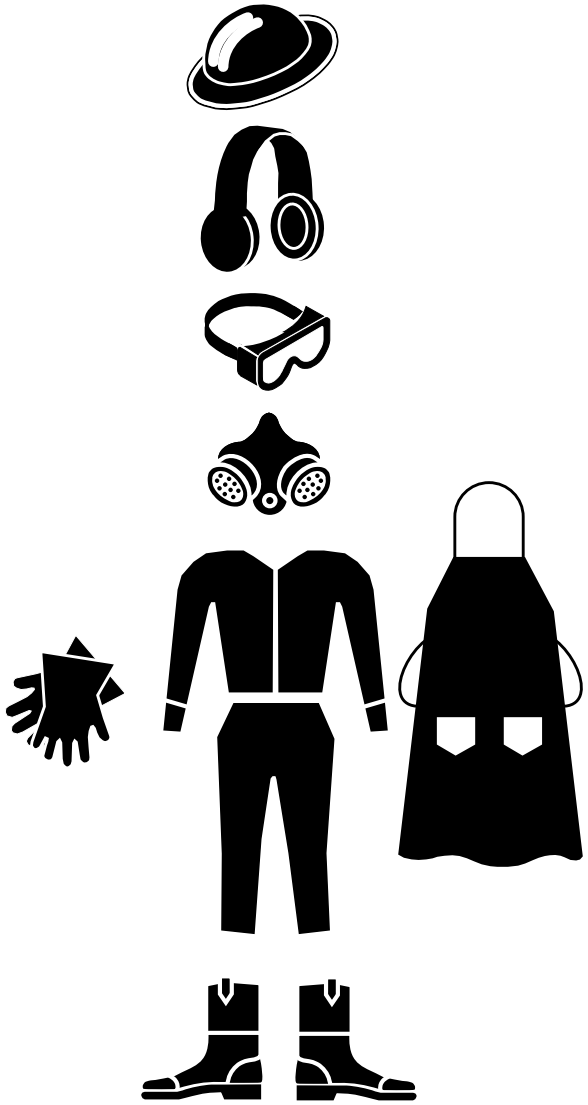
- ▲ *Read and understand "**Safety Reflectors and Decals**" on page 7, thoroughly.*
- ▲ *Read all instructions noted on the decals.*
- ▲ *Keep decals clean. Replace damaged, faded and illegible decals.*



Wear Protective Equipment

Great Plains advises all users of chemical pesticides or herbicides to use the following personal safety equipment.

- ▲ *Waterproof, wide-brimmed hat*
- ▲ *Waterproof apron.*
- ▲ *Face shield, goggles or full face respirator.*
- ▲ *Goggles with side shields or a full face respirator is required if handling or applying dusts, wettable powders, or granules or if being exposed to spray mist.*
- ▲ *Cartridge-type respirator approved for pesticide vapors unless label specifies another type of respirator.*
- ▲ *Waterproof, unlined gloves. Neoprene gloves are recommended.*
- ▲ *Cloth coveralls/outer clothing changed daily; waterproof items if there is a chance of becoming wet with spray*
- ▲ *Waterproof boots or foot coverings*
- ▲ *Do not wear contaminated clothing. Wash protective clothing and equipment with soap and water after each use. Personal clothing must be laundered separately from household articles.*
- ▲ *Clothing contaminated with certain pesticides must be destroyed according to state and local regulations. Read chemical label for specific instructions.*
- ▲ *Wear clothing and equipment appropriate for the job. Avoid loose-fitting clothing.*
- ▲ *Prolonged exposure to loud noise can cause hearing impairment or loss. Wear suitable hearing protection such as earmuffs or earplugs.*
- ▲ *Avoid wearing entertainment headphones while operating machinery. Operating equipment safely requires the full attention of the operator.*



Handle Chemicals Properly

Agricultural chemicals can be dangerous. Improper use can seriously injure persons, animals, plants, soil and property.

- *Read and follow chemical manufacturer's instructions.*
- *Always keep hand-wash tank filled with clean water and have soap available in case of an emergency. Immediately and thoroughly flush any area of the body that is contaminated by chemicals.*
- *Do not touch sprayer components with mouth or lips.*
- *If persons are exposed to a chemical in a way that could affect their health, consult a doctor immediately with the chemical label or container in hand. Any delay could cause serious illness or death.*
- *If chemical is swallowed, carefully follow the chemical manufacturer's recommendations and consult with a doctor.*
- *Wear protective clothing.*
- *Handle all chemicals with care.*
- *Spray only with acceptable wind conditions. Wind speed must be below 5 mph (8 kph). Make sure wind drift of chemicals will not affect any surrounding land, people or animals.*
- *Before adding chemical to the tank, make sure tank is at least half full. Do not pour concentrate into an empty tank.*
- *Never leave fill hose attached to the sprayer after filling tank. Chemicals in tank can siphon out of tank and contaminate freshwater source.*
- *Avoid inhaling smoke from any type of chemical fire.*
- *Rinse out the tank. Spray rinse water on last field sprayed.*
- *Never drain, rinse or wash dispensers within 100 feet (30m) of a freshwater source, nor at a car wash.*
- *Dispose of empty chemical containers properly. By law rinsing of the used chemical container must be repeated three times. Puncture the container to prevent future use. An alternative is to jet-rinse or pressure rinse the container.*
- *Store or dispose of unused chemicals as specified by chemical manufacturer.*
- *Wash hands and face before eating after working with chemicals. Shower as soon as spraying is completed for the day.*

Avoid High Pressure Fluids

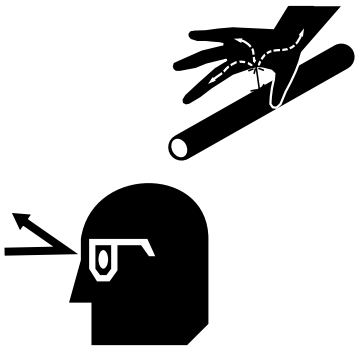
Escaping fluid under pressure can penetrate the skin, causing serious injury.

▲ *Avoid the hazard by relieving pressure before disconnecting hydraulic lines.*

▲ *Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.*

▲ *Wear protective gloves and safety glasses or goggles when working with hydraulic systems.*

▲ *If an accident occurs, seek **immediate** medical attention from a physician familiar with this type of injury.*

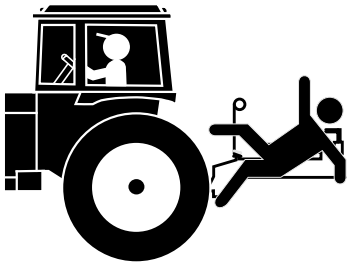


Keep Riders Off Machinery

Riders obstruct the operator's view. Riders could be struck by foreign objects or thrown from the machine.

▲ *Never allow children to operate equipment.*

▲ *Keep all bystanders away from machine when folding/unfolding, raising/lowering, transporting, operating, loading and off-loading chemicals.*

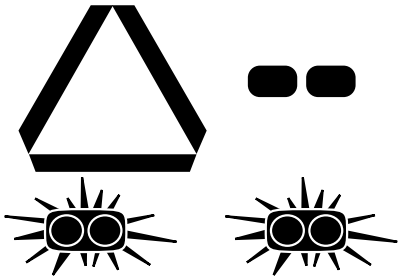


Use Safety Lights and Devices

Slow-moving tractors and attached implements can create a hazard when driven on public roads. They are difficult to see, especially at night.

▲ *Use flashing warning lights and turn signals whenever driving on public roads.*

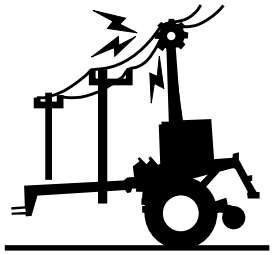
▲ *Use tractor lights.*



Check for Overhead Lines

Sprayer markers contacting overhead electrical lines can introduce lethal voltage levels on sprayer and tractor frames. A person touching almost any metal part can complete the circuit to ground, resulting in serious injury or death. At higher voltages, electrocution can occur without direct contact.

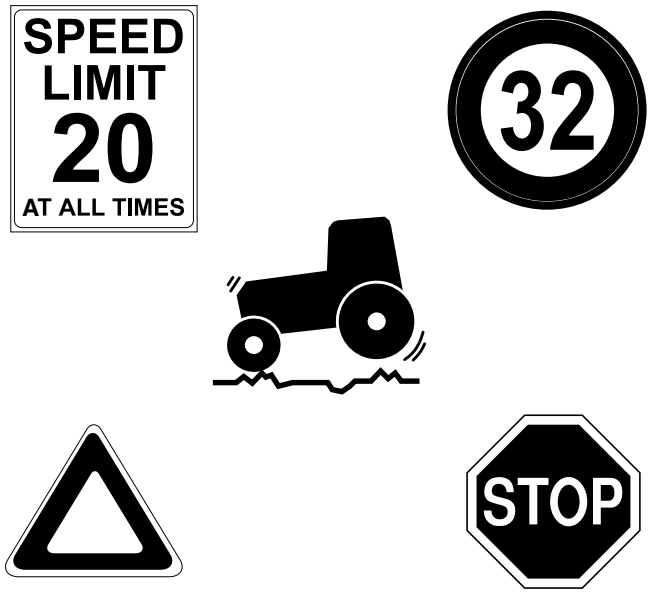
▲ *Avoid overhead lines during sprayer operations.*



Transport Machinery Safely

Maximum transport speed for sprayer is 20 mph (32 kph). Some rough terrains require a slower speed. Sudden braking can cause a heavy 3-point load to swerve and upset the tractor.

- ▲ *Follow your tractor manual recommendations for maximum hitch loads. See "**Specifications and Capacities**" on page 57. Insufficient weight on tractor steering wheels will result in loss of control.*
- ▲ *Do not exceed 20 mph (32 kph). Never travel at a speed which does not allow adequate control of steering and stopping.*
- ▲ *Comply with national, regional and local laws.*
- ▲ *Carry reflectors or flags to mark tractor and sprayer in case of breakdown on the road.*
- ▲ *Keep clear of overhead power lines and other obstructions when transporting. Refer to transport dimensions under "**Specifications and Capacities**" on page 57.*

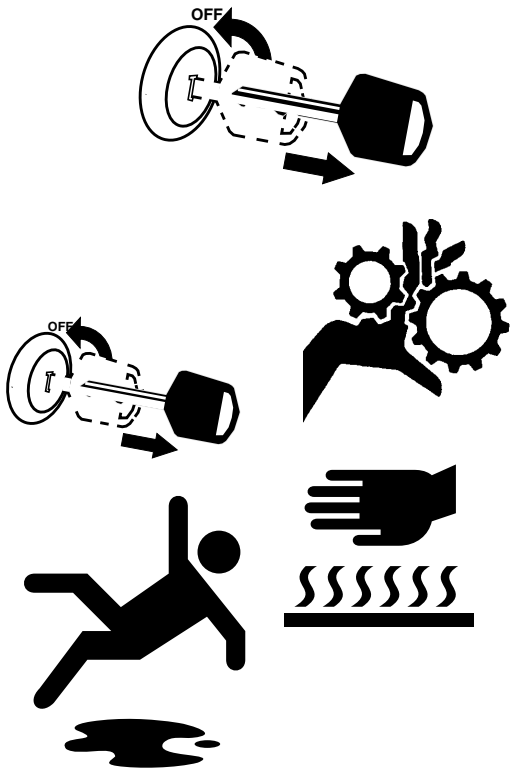


Shutdown and Storage

- ▲ *Clean out and safely store or dispose of residual chemicals.*
- ▲ *Secure sprayer using supports provided.*
- ▲ *Store in an area where children normally do not play.*

Practice Safe Maintenance

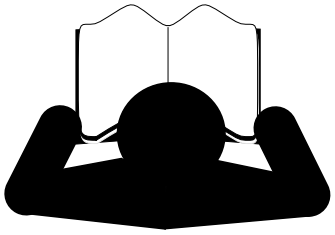
- ▲ *Understand procedure before doing work. Use proper tools and equipment. Refer to this manual for additional information.*
- ▲ *Work in a clean, dry area.*
- ▲ *Put tractor in park, turn off engine, and remove key before performing maintenance.*
- ▲ *Make sure all moving parts have stopped and all system pressure is relieved.*
- ▲ *Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on sprayer.*
- ▲ *Inspect all parts. Make sure parts are in good condition and installed properly.*
- ▲ *Remove buildup of grease, oil or debris.*
- ▲ *Remove all tools and unused parts from sprayer before operation.*

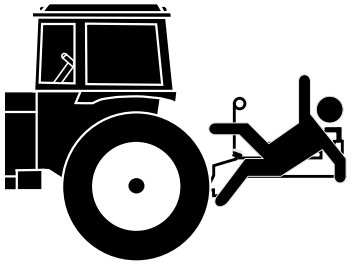


Safety At All Times

Thoroughly read and understand the instructions in this manual before operation. Read all instructions noted on the safety decals.

- ▲ *Be familiar with all sprayer functions.*
- ▲ *Operate machinery from the driver's seat only.*
- ▲ *Do not leave sprayer unattended with tractor engine running.*
- ▲ *Do not dismount a moving tractor. Dismounting a moving tractor could cause serious injury or death.*
- ▲ *Do not stand between the tractor and sprayer during hitching.*
- ▲ *Keep hands, feet and clothing away from power-driven parts.*
- ▲ *Wear snug-fitting clothing to avoid entanglement with moving parts.*
- ▲ *Watch out for wires, trees, etc., when folding and raising drill. Make sure all persons are clear of working area.*
- ▲ *Use only water without pesticides added to calibrate the sprayer. Do not exceed the calibrated sprayer speed and pressure when operating.*
- ▲ *When using a PTO pump, be sure that PTO shield is in place on the tractor, PTO coupler bolts are torqued to the correct specification, and torque bar is properly chained to tractor drawbar.*





Safety Reflectors and Decals

Your sprayer comes equipped with all safety reflectors and decals in place. They were designed to help you safely operate your sprayer.

▲ *Read and follow decal directions.*

▲ *Keep all safety decals clean and legible.*

▲ *Replace all damaged or missing decals. Order new decals from your Great Plains dealer. Refer to this section for proper decal placement.*

▲ *When ordering new parts or components, also request corresponding safety decals.*

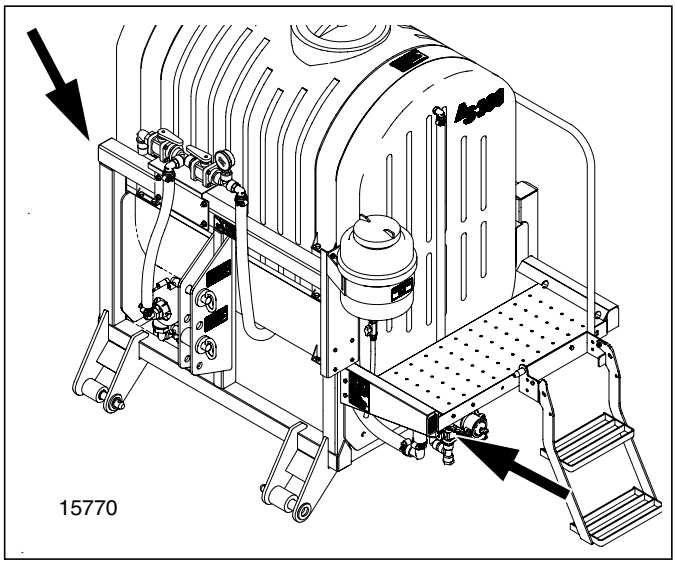
To install new decals:

1. Clean the area on which the decal is to be placed.
2. Peel backing from decal. Press firmly on surface, being careful not to cause air bubbles under decal.

Amber Reflectors

818-229C

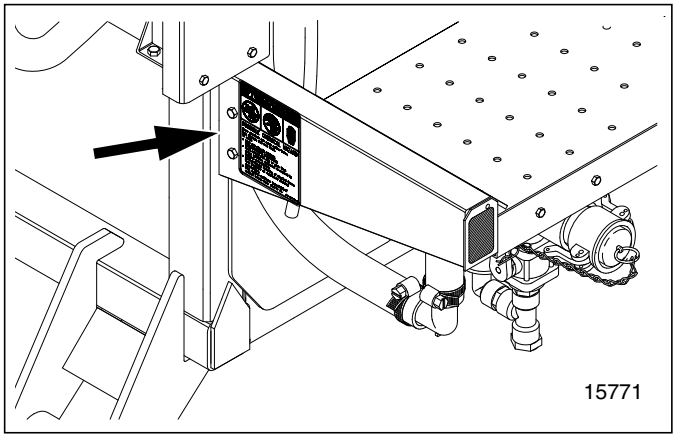
outside right end of top 3-point frame tube, outside forward corner of walkboard;
2 total



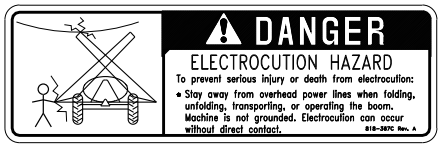
Danger: Agricultural Chemicals

818-323C

forward end of walkboard;
1 total

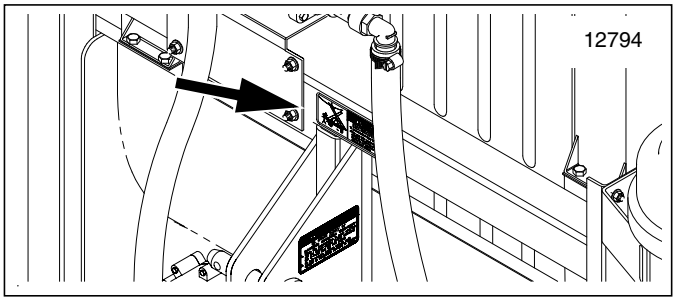


Danger: Electrocution Hazard

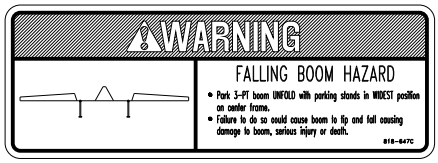


818-367C

top center of 3-point frame;
1 total

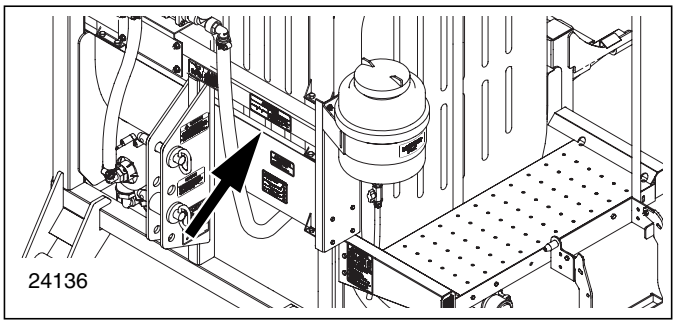


Warning: Falling Boom Hazard

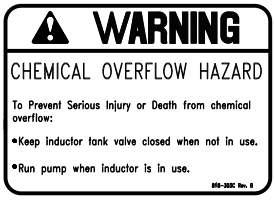


818-647C

front face, right of center, 3-point frame;
1 total

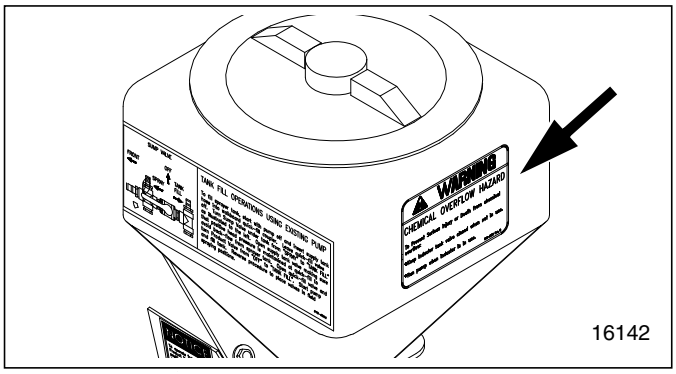


Warning: Chemical Overflow (Option)



818-303C

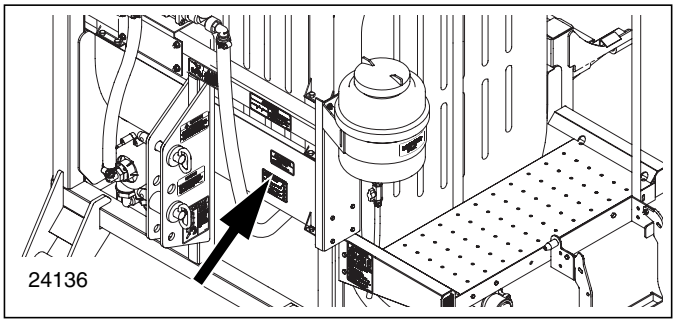
outside face of inductor tank;
1 total



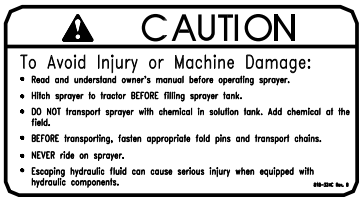
Warning: Parking Stand

818-655C

front face, right of center, 3-point frame;
1 total

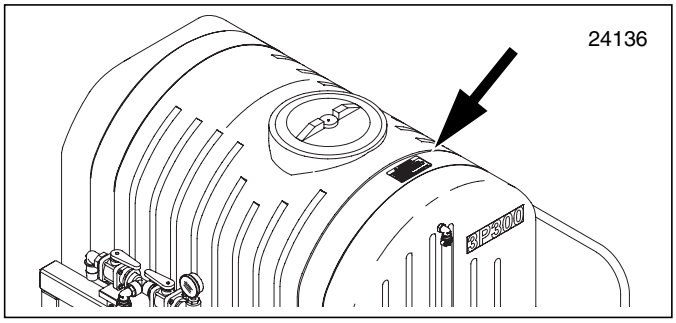


Caution: General Sprayer



818-324C

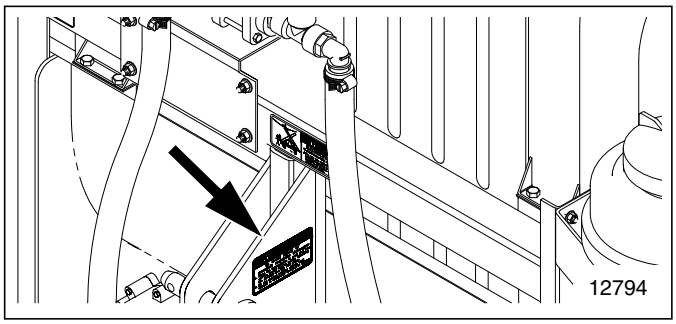
top of tank, walkboard end;
1 total



Caution: Tractor Hookup

818-466C

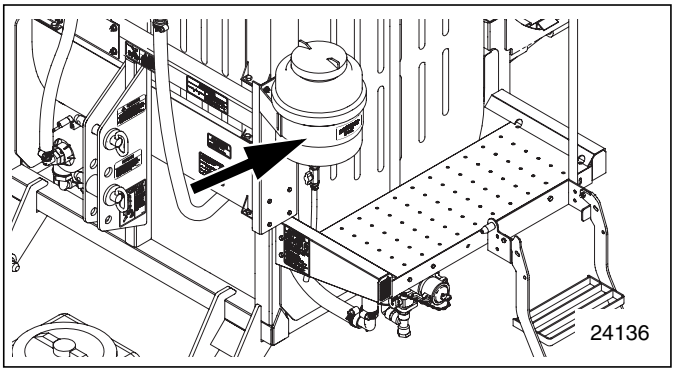
left side, top hitch weldment;
1 total



Safety: Hand Wash Tank

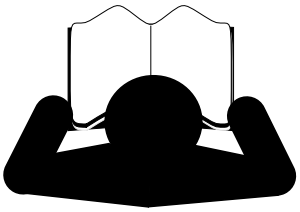
818-304C

left side of hand wash tank;
1 total



Introduction

Great Plains welcomes you to its growing family of new product owners. Your Three-Point Sprayer has been designed with care and built by skilled workers using quality materials. Proper setup, maintenance, and safe operating practices will help you get years of satisfactory use from the machine.



Document Family

500-103M-A	Operator Manual (this document)
500-103P	3P300 S/N HH1113+ Parts Manual
506-582M	CF500 and CF600 Boom Operator
509-200M	Application Guide
832-038C	Nozzle Calculator (U.S. customary)
832-058C	Nozzle Calculator (Metric)
016-0159-822	Raven SCS 440 manual[a]

Description of Unit

The 3P300 S/N HH1113+ is a 3-point implement. It has a working width of 50 or 60 feet (15.2 or 18.3m) depending on the Great Plains boom installed. Pumps are optional, and may be sprayer- or tractor-mounted.

Intended Usage

Use this sprayer to apply chemicals to production-agriculture crops only. Do not modify the sprayeror boom for use with attachments other than those approved by Great Plains.

Models Covered

3P300, serial number HH1113 or later, with one of:
CF500 50-foot (15.2m) Hydraulic Folding Boom
CF600 60-foot (18.3m) Hydraulic Folding Boom

Using This Manual

This manual familiarizes you with safety, assembly, operation, adjustments, troubleshooting, and maintenance. Read this manual and follow the recommendations to help ensure safe and efficient operation.

The information in this manual is current at printing. Some parts may change to assure top performance.

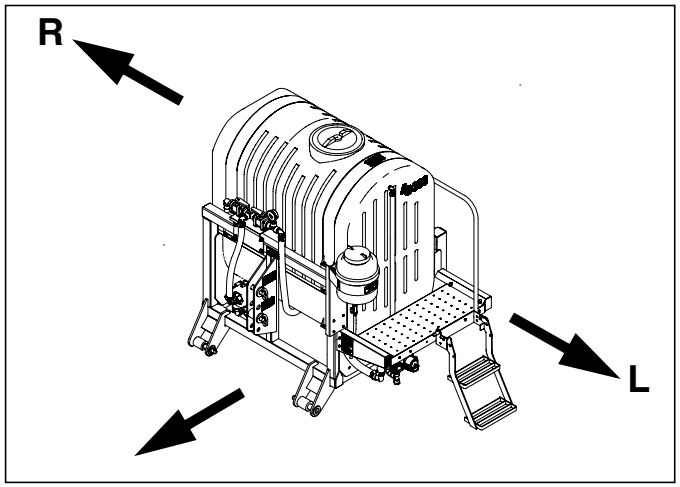


Figure 1 15770
3P300 S/N HH1113+ Sprayer

Definitions

The following terms are used throughout this manual.

Right-hand and left-hand as used in this manual are determined by facing the direction the machine will travel while in use unless otherwise stated.

IMPORTANT !

Paragraphs in this format present a crucial point of information related to the current topic.

Read and follow the directions to:
- remain safe,
- avoid serious damage to equipment and
- ensure desired field results.

Note: Paragraphs in this format provide useful information related to the current topic.

a. Order or download from Raven Industries (www.ravenprecision.com).

Owner Assistance

If you need customer service or repair parts, contact a Great Plains dealer. They have trained personnel, repair parts and equipment specially designed for Great Plains products.

Refer to Figure 2

Your machine's parts were specially designed and should only be replaced with Great Plains parts. Always use the serial and model number when ordering parts from your Great Plains dealer. The serial-number plate is located on the front face of the left vertical tube of the 3-point frame.

Record your sprayer model and serial number here for quick reference:

Model Number:_____

Serial Number: _____

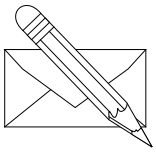
Your Great Plains dealer wants you to be satisfied with your new machine. If you do not understand any part of this manual or are not satisfied with the service received, please take the following actions.

1. Discuss the matter with your dealership service manager. Make sure they are aware of any problems so they can assist you.
2. If you are still unsatisfied, seek out the owner or general manager of the dealership.

For further assistance write to:

Product Support

Great Plains Mfg. Inc., Service Department
PO Box 5060
Salina, KS 67402-5060



gp_web_cs@greatplainsmfg.com

785-823-3276

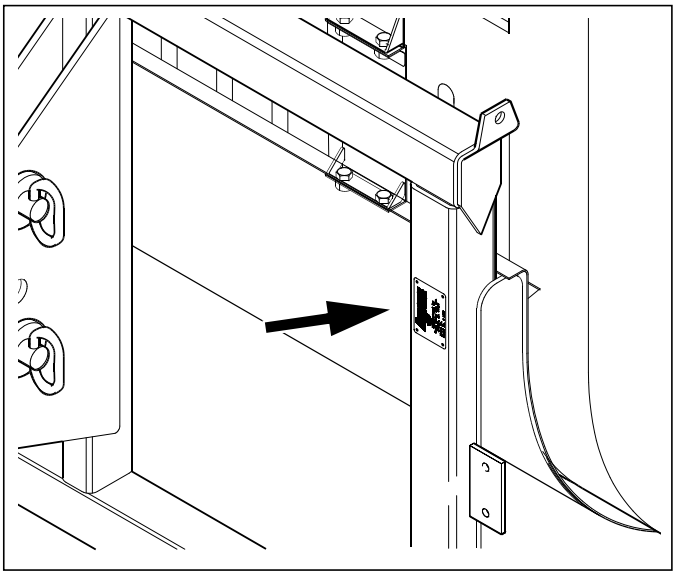


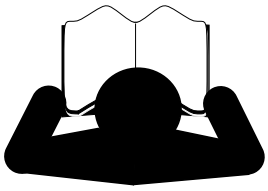
Figure 2
Serial Number Plate

15781

Preparation and Setup

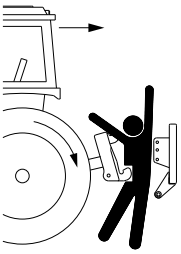
This section helps you prepare your tractor, sprayer and boom for use. Before using the sprayer in the field, you must hitch the sprayer to a suitable tractor and also setup the sprayer.

Note: Sprayer setup presumes that the separately-ordered boom has already been installed, and all pre-delivery checks completed. If this is not the case, contact your dealer for assistance. The boom is not normally a customer-installed accessory.



Pre-Setup Checklist

1. Read and understand "**Important Safety Information**" on page 1.
2. Check that all working parts are moving freely, bolts are tight, and cotter pins are spread.
3. Check that all grease fittings are in place and lubricated. See "**Lubrication**" on page 50.
4. Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See "**Safety Reflectors and Decals**" on page 7.
5. If removing sprayer from storage, remove any grease applied to protect cylinder rods (see page 40).



Hitching Tractor to Sprayer

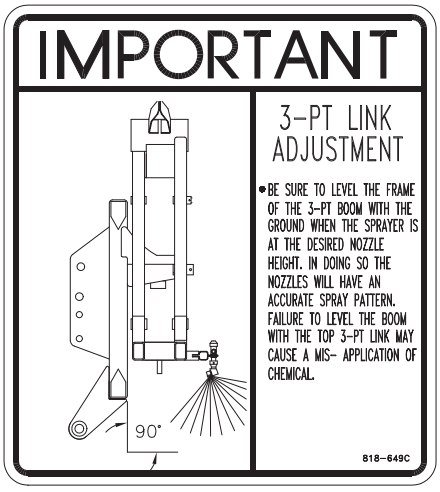
DANGER

You may be severely injured or killed by being crushed between the tractor and sprayer. Do not stand or place any part of your body between machines being hitched. Stop tractor engine and set park brake before installing hitch pins.

WARNING

*Be certain that tractor lift capacity is adequate and that tractor is weighted to maintain steering control. Failure to do so may result in insufficient weight on the steering wheels, and cause loss of vehicle control. Refer to Tractor Specifications, "**Specifications and Capacities**" on page 57. Consult the tractor operator's manual for tractor weighting recommendations.*

Be sure to include the weight of the boom, any material in the tanks, and all accessories.



Refer to Figure 3

1. Determine the pin and spacer orientation needed for the tractor, and securely fasten the hitch pins.
2. Mount the Three-Point Sprayer to a tractor with the correct pin mountings determined from instruction step 1. Make sure that the sprayer frame is level so that after the boom is assembled, it won't hit the tractor cab when the boom is folded or raised.

IMPORTANT !

The category 4 narrow hitch (CAT IV-N) spacers are not standard 3-Point Sprayer parts. Order 501-011S (Cat IV-N spacers) from a Great Plains dealer.

Leveling Sprayer

Be sure that the top 3-Point link is adjusted correctly so that the frame is level in operating position but will not hit the cab in transport. The tractor 3-Point arms should be adjusted to keep the sprayer level from side to side with lift arm rigid.

Leveling Boom

See Boom Operator manual for boom leveling instructions.

Electrical Connections

For a new sprayer (or moving to a different tractor), first complete tractor electrical installation (See "**Cab and Optional Components**" on page 18), and installation of any sprayer Options not factory- or dealer-installed.

	Connection	Comment
❑	Raven Controller	Standard (two connectors)
❑	Electro-Hydraulics	Optional (two connectors)
❑	Foam Marker	Optional
❑	Radar Sensor	Optional - routine hook-up only if sensor is sprayer-mounted

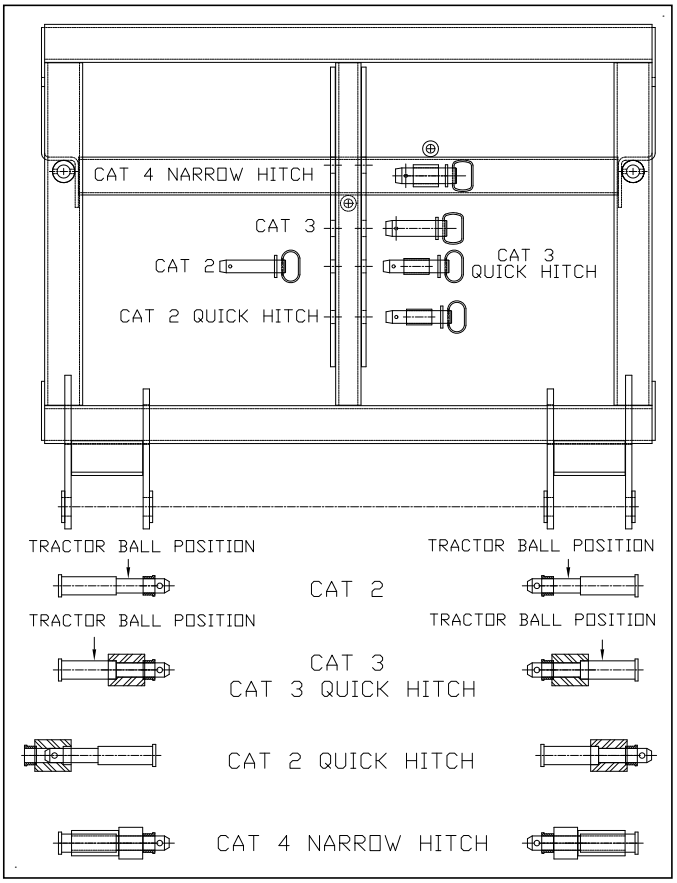


Figure 3
Hitch Pins and Spacers

12654

Hydraulic Hookup

The standard 3P300 sprayer has a hydraulic hose pair for each boom, terminated with a 9/16 FJIC connectors. Couplers suitable for the specific tractor must be customer- or dealer-installed. Some Options include Poppet style Quick Disconnect (QD) fittings.

Sprayers require one to four total tractor hydraulic circuits, depending on Options:

Hose Pairs	Options	Circuit Functions
1	• Electro-Hydraulic	a. Boom Fold
1	• Elevator • Electro-Hydraulic	a. Boom Fold or Elevator
2	- none	a. Boom Fold, Left b. Boom Fold, Right
2	• Elevator • Electro-Hydraulic • Hydraulic Pump	a. Boom Fold or Elevator b. Pump
3	• Elevator	a. Boom Fold, Left b. Boom Fold, Right c. Elevator
4	• Elevator • Hydraulic Pump	a. Boom Fold, Left b. Boom Fold, Right c. Elevator d. Pump

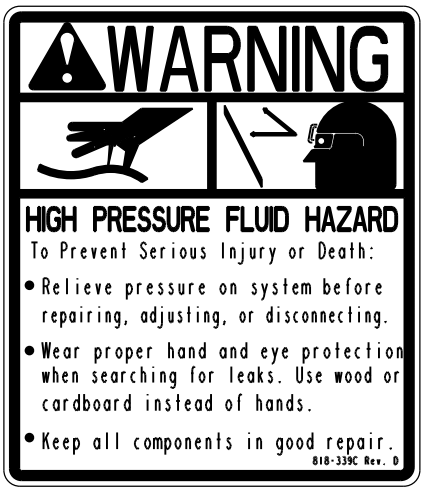
Refer to Figure 4

Both hose sets have labels for flow conventions. These labels use cylinder Base/Extend and Rod/Retract icons.

Sprayer Control Hydraulic Hookup

If the sprayer has a hydraulic pump, and the tractor has only one circuit capable of continuous flow or only one capable of adjustable continuous flow, reserve that circuit for the pump, and others for fold and lift. Connect the Rod/Base ends to remote ports for the following operating conventions:

Tractor Lever Forward	Sprayer Component Operation
Boom Fold	Fold
Elevator	Lift
Hydraulic Pump	Pump (see page 15 for more detail)



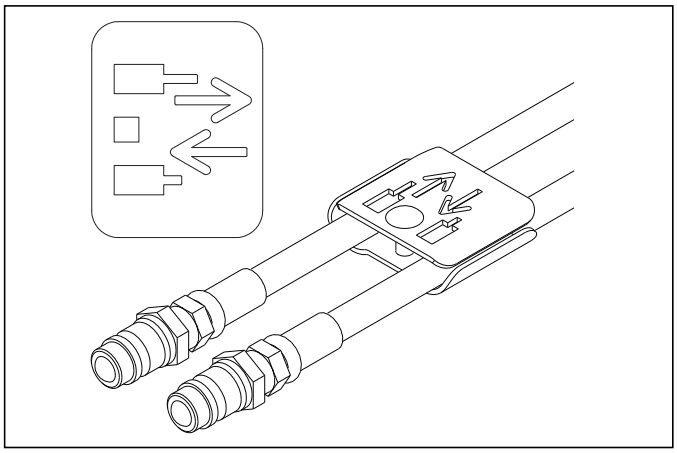


Figure 4
Hose Label

27270

Hydraulic Pump Hook Up

The hydraulic motor used on all liquid pumps is a 6 gpm (23 liter/min.) motor. If the tractor used on the sprayer does not have the capabilities to adjust the remotes down to this flow, then a Hydraulic Flow Divider Kit must be installed so that flow can be controlled to prevent operating the pump at excessive speeds. See an Great Plains dealer for more information.

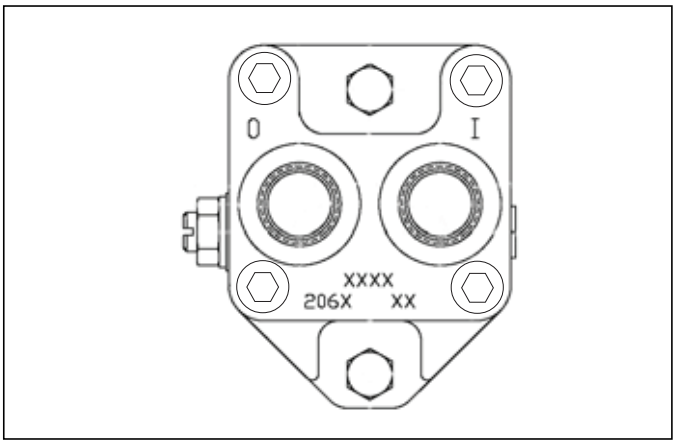


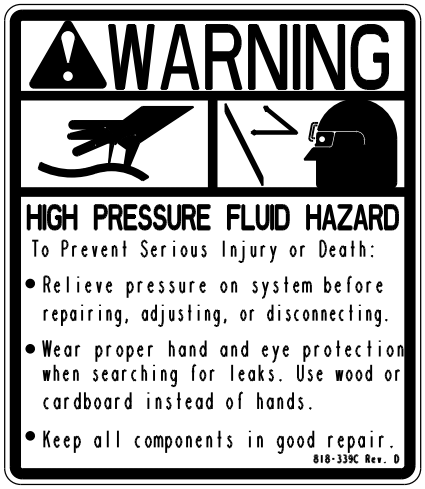
Figure 5 27141
Ace Pump Connections

Refer to Figure 5

1. The pressure hose coming out of the tractor remotes must be connected to the motor inlet port (“I” on current pumps; “A” on older pumps), and the return line connected to the motor outlet (“O” on current pumps, “B” on older pumps).
2. Before operating, place a stop in the Neutral position for the tractor hydraulics so that the hydraulic lever can only be moved to the float and forward/down positions. Refer to the tractor’s operator’s manual or tractor dealer on information for the neutral stop.

Note: DO NOT move the hydraulic lever into the neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.

3. To determine the correct setting of the flow rate, start out with the hydraulic flow control valve set at a minimum flow for the pair of outlets that operate the pump.
4. With water in the sprayer tank and in the pump, place the hydraulic lever in the float position.
5. Open up the sprayer flow control valve to its maximum setting.
6. Start the tractor and engage the pump by placing the hydraulic lever in the down (forward) position.
7. Once the system builds pressure, close the agitation valve, shut off the boom section switches, and close the throttling valves (if applicable).
8. The pump is now at dead head pressure and the hydraulic control valve must be adjusted so that the spray pressure reaches 80 PSI maximum on the nozzle pressure gauge. This process should be done with the tractor throttle set at normal operating speed. Mark this setting on the hydraulic control valve for future reference.
9. Open up the agitation valve and reset the throttling valves (if applicable). See “**Pressure Adjustments**” on page 41.



Great Plains PTO Pump Hookup

DANGER

Entanglement hazard - Keep hands, hair, loose clothing, lanyards and feet well away from a rotating PTO drive line. Shut off tractor completely before hitching, unhitching, or making any adjustments to or near the PTO.

1. Position the PTO pump on the tractor's PTO shaft with the coupler bolt removed on the splined end.
2. Push the coupler of the pump on to align with notch in the tractor PTO shaft and install bolt.
3. For a 540 RPM pump or a 1000 RPM $1\frac{3}{8}$in spline pump, torque the $\frac{1}{2}$in Grade 8 coupler bolts to 105 ft-lbs.
4. Rotate the PTO shaft by hand to make sure the bolts clear the PTO shielding.
5. Securely attach the torque bar chain to the tractor drawbar. Allow just enough slack to permit a full range of three point hitch operations, such as raising/lowering, and leveling.
6. Rotate the pump housing in the direction of PTO rotation, to the full extension of the chain.
7. Hook the tarp strap so that the pump holds the chain at full extension through the full range of three point hitch operations. This prevents the torque arm from snapping the chain to full extension at PTO startup.
8. Tie up any loose hoses with cable ties to prevent hose damage.
9. With water in the sprayer tank, and water in the pump, engage the PTO shaft slowly with the tractor engine idling.

   Once the system builds pressure, close the agitation valve, shut off the boom section switches and close throttling valves (if applicable). Sprayers with automatic controllers do not have throttling valves. The pump is now at dead head pressure.

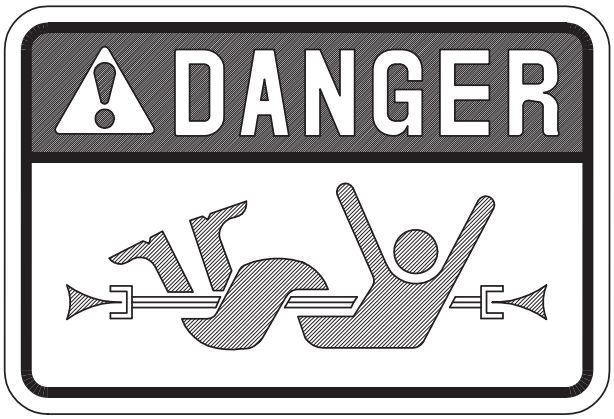
   Adjust the engine RPM so that the spray pressure reaches 80 PSI maximum on the nozzle pressure gage, or the PTO speed reaches the rated RPM (540 or 1000), whichever is first.

   Never exceed the rated tractor PTO RPM. This is the RPM needed to spray, but without excess pressure in the sprayer's plumbing.

Ace PTO Pump Hookup

DANGER

Entanglement hazard - Keep hands, hair, loose clothing, lanyards and feet well away from a rotating PTO drive line. Shut off tractor completely before hitching, unhitching, or making any adjustments to or near the PTO.



1. 540 (rpm) PTO Pump:
   Attach the pump to the tractor PTO shaft by tightening the three screwdriver slotted set screws and jam nuts in the coupler. Make certain the set screws are in line with the retaining groove on the tractor PTO shaft.

   1000 (rpm) PTO Pump:
   Attach the pump to the tractor PTO shaft. Make sure screwdriver slotted set screws are aligned with retaining groove on tractor PTO shaft
   - BUT DO NOT TIGHTEN.
   Next, align the split in the slit-ring locking collar with corresponding split in the pump drive shaft. Securely tighten the $^{5}/_{16}$in hex head set screw in the locking collar, then tighten the three slotted head set screws and jam nuts.
2. To keep the pump body from rotating with the tractor PTO shaft, affix one end of a torque chain to the “cold shut” shackle on the pump, and one end to the tractor.
3. Securely attach the torque bar chain to the tractor drawbar. Allow just enough slack to permit a full range of three point hitch operations, such as raising/lowering, and leveling.

Note: Do not fasten the pump rigidly in position with the Torque Chain. To do so will cause damage to the pump. Fasten the pump so that the chain holds the pump and that there can be slack in the chain.

4. Rotate the pump housing in the direction of PTO rotation, to the full extension of the chain. If a tarp strap is available, use it to hold the pump at full chain extension through the full range of three point hitch operations. This prevents the torque arm from snapping the chain to full extension at PTO startup.

Ace PTO belt driven centrifugal pumps may be swung to the bottom, top or either side of the tractor PTO shaft in order to make it fit a particular tractor. The pump operates satisfactorily in all these positions.

IMPORTANT !

Remember that the discharge port in the volute should always be at the top (the 12 o’clock or 3 o’clock position) to aid in priming.

Cab and Optional Components

Raven SCS 440

The Raven SCS 440 (Sprayer Control System) is standard, and the sprayer-side components (other than speed sensor) are pre-installed.

The SCS 440 system consists of a computer-based Control Console, a Speed Sensor, a turbine type Flow Meter and a motorized Control Valve. The Console mounts directly in the cab of the tractor for easy operator use. The optional speed sensor is usually tractor-mounted. The motorized Control Valve and Flow Meter mount to the framework supporting the boom valves. Appropriate cabling is furnished for field installation.

The controller module must be installed in the tractor cab prior to first use, and must be connected to one or more tractor systems, including:

- battery power (red:+, black:-)
- existing or new speed sensor, if tractor-mounted (and if new tractor mount, the sensor must be installed)

Your Great Plains dealer can assist with the installation. A Raven installation and service manual are provided.

Once installed and connected for the first time, setup and calibration steps are necessary prior to first field operations. See “**Sprayer Calibration**” on page 21.

It is important to read and understand the Raven manual before operating the system.

The operator sets the target volume per area to be sprayed and the SCS 440 automatically maintains the flow regardless of vehicle speed or gear selection. A manual override switch allows the operator to manually control flow for system check-out and spot spraying. Actual volume per area being applied is displayed at all times. The SCS 440 additionally functions as an area monitor, speed monitor and volume totalizer.

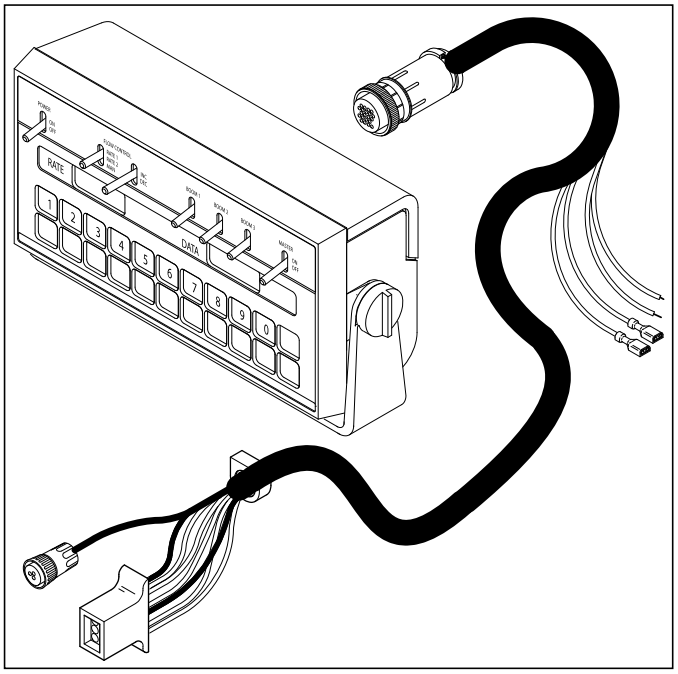


Figure 6 28124
Raven SCS 440 and Cab Cable

Raven Setup

Current 3P300 sprayers include a Raven SCS 440 controller as standard equipment. The controller needs to be installed in the tractor cab, and cables run to the sprayer, speed sensor and battery prior to first use. Consult the included Raven manual for installation instructions.

This data is retained as long as the SCS 440 remains connected to battery power. If power is removed for electrical work, long term tractor parking or welding, the data is lost and must be re-entered.

Consult the Raven manual for display interpretation and keyboard procedures.

The following data is needed for Raven setup:

Model	Description	BOOM CAL	SPEED CAL	METER CAL	VALVE CAL
3P300 & CF500(20)	50 foot 20in spacing	ZZ in (ZZ cm)		Cable Tag[a]	Body Label[b]
3P300 & CF500(30)	50 foot 30in spacing	ZZ in (ZZ cm)		Cable Tag[a]	Body Label[b]
3P300 & CF600(20)	60 foot 20in spacing	ZZ in (ZZ cm)		Cable Tag[a]	Body Label[b]
3P300 & CF600(30)	60 foot 30in spacing	ZZ in (ZZ cm)		Cable Tag[a]	Body Label[b]

a. This value is printed on a durable tag attached to the meter cable.
b. This value, typically “2123”, is printed on the label on the valve body.

Speed Sensors

The Auto-Control option itself does not include a speed sensor (as there is a choice of sensors; alternatively, the tractor may already have a suitable sensor, and needs only a Y-cable). If a sensor was ordered for the sprayer, it needs to be mounted on the tractor or the sprayer. An installation manual is included with the option.

- The radar sensor (page 55) may be mounted on the sprayer or the tractor. Great Plains recommends tractor-mounting, which has these benefits:
  - eliminates a connection during hitching,
  - keeps the radar well away from spray,
  - may allow a clearer radar view of the ground, and;
  - makes the radar available for other implements.
- The wheel sensor (page 56) must be tractor-mounted, as the 3P300 has no wheels.

Route the harness included with the sensor to the speed sensor input.

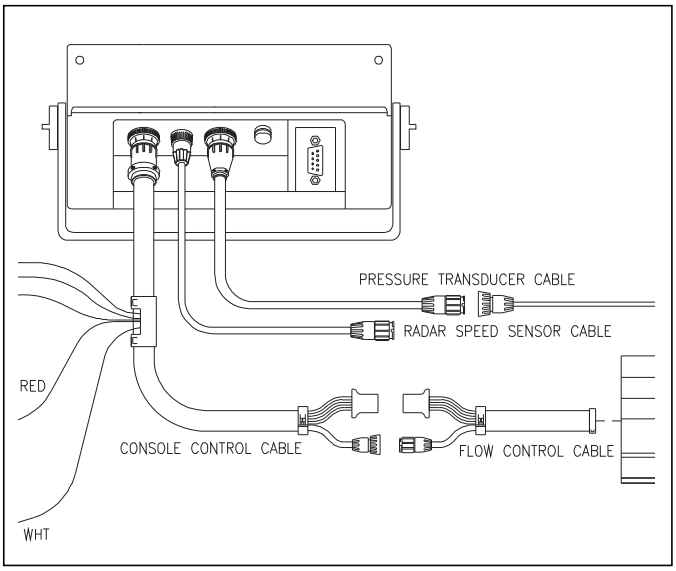


Figure 7 28164
Raven SCS 440 Speed Input

Electro-Hydraulic Controller

If the sprayer has the optional electro-hydraulic (E-H) controller (page 53), it includes either a switchbox or joystick controller that must be mounted in the tractor cab. An installation manual is included with the option.

- The joystick style controller includes an assortment of U-bolts for attaching the joystick to the hydraulic lever that will control the sprayer boom and elevator circuit.
- The switchbox includes a mounting base. Customer- or dealer-supplied fasteners or mounting tape are required. Mount the switchbox at a convenient location that does not obstruct the view of the highway or key tractor and implement functions.

Route the harness to the hitch.

Connect power leads to a 12Vdc source. Color code is:
Red: Positive (+)
Black: Negative (-) and ground

If possible, connect to tractor power on the device side of a main power switch or relay, so that there is no risk of E-H solenoids consuming battery power when not in use.

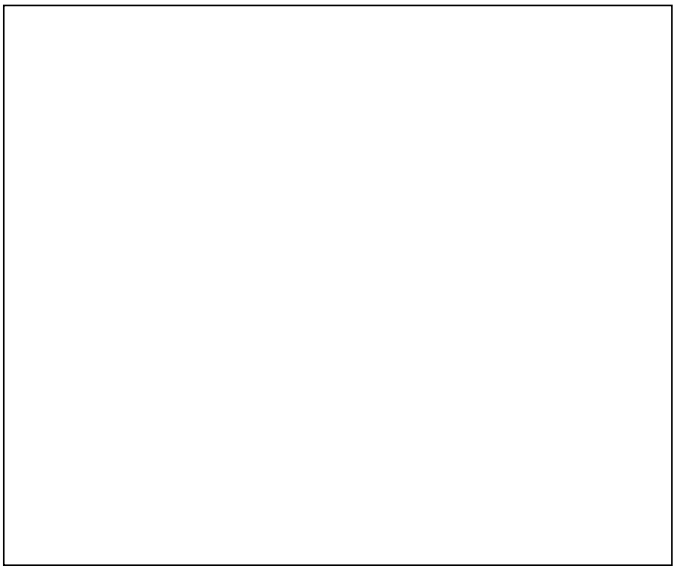


Figure 8 99999
Electro-Hydraulic Cab Controls

Ace Pump Flow Limiter (Optional)

The flow limiter (see page 54) is a hydraulic device designed to shut off the flow of hydraulic oil when a specified flow is exceeded. On tractors with LOAD SENSING (LS) Closed Center hydraulic systems, this device limits the flow of oil to the Ace motor and prevents failures due to misapplication.

Newer Case-IH, John Deere, New Holland, and CAT tractors, present a great potential to turn the motors beyond their rated speeds. Flows out of the hydraulic valves can exceed 20 gpm while the motors are rated at 4-11 gpm. The flow limiter protects the Ace motor by shutting off when hydraulic flows exceed the motor's capacity.

The flow limiter should not be used on OPEN Center or PRESSURE COMPENSATING Closed Center hydraulic systems. The flow limiter should not be used with a restrictor orifice.

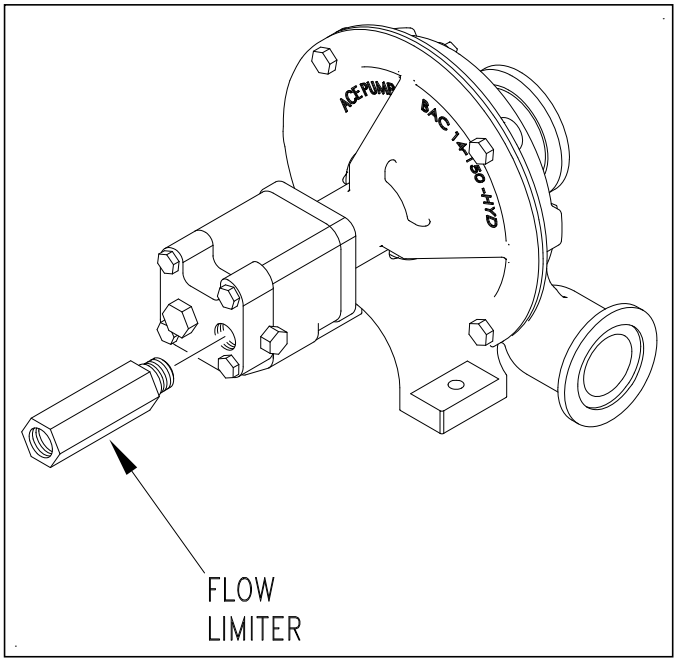


Figure 9 23395
Ace Pump Flow Limiter

Flow Limiter Installation

1. Install the flow limiter in the inlet port of the Ace motor.
2. Close the needle valve on the Ace motor by loosening the jam nut and screwing the needle valve in a clockwise direction all the way down.
3. Connect the hydraulic hoses so that the pump runs with the hydraulic lever in the "Lower/Retract" position. Connect return hose to Low Pressure Return Port, when available.
4. Shut off boom and agitation valves on the sprayer to deadhead the sprayer pump flow.
5. Adjust the flow control on the tractor to the minimum flow setting (turtle).
6. Move the hydraulic lever to the "Lower/Retract" position.

Note: Always shut the pump off in the "Float" position. This eliminates high pressure being trapped in the return line and protects hydraulic seals. Avoid returning the oil to the remote valve; use the Low Pressure Return port, when available.

7. Adjust the flow control on the tractor until the sprayer system dead head pressure is 80 psi.

Note: If the flow limiter stops the flow of oil to the motor:

7a) Move the hydraulic lever to the "Neutral" position. This removes the oil pressure from the flow limiter and allows it to reset.

7b) Adjust the flow control to a lower flow position.

7c) Repeat step 6 and step 7.

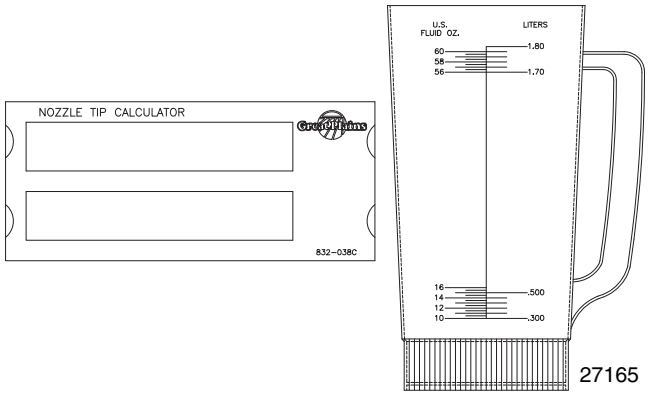
8. Set sprayer pressure by opening the agitation valve.

Sprayer Calibration

Sprayer calibration prepares your sprayer for operation and diagnoses nozzle wear. This gives you optimum performance from your nozzles and ensures accurate application.

Equipment that may be needed:

- 817-199C Calibration Container
- Great Plains Nozzle Tip Calculator:
  832-038C - U.S. customary units (English), or
  832-058C - Metric (English/Russian legends)
- General calculator
- Stopwatch or wristwatch with second hand.



27165

Manual Pressure Valve

Refer to Figure 10

When the manual pressure valve [2] is full open, the pressure adjustment can be very sensitive.

- If sprayer is equipped with an automatic controller, the butterfly valve will have to move more often causing additional wear.
- If your 2007- sprayer is equipped with manual controls plumbing, the pressure adjustment switch on the control box will be more sensitive and it will be hard to set the pressure.

To decrease the sensitivity, set the manual pressure adjustment valve as follows:

1. Open the control valve so that it is wide open and there is full flow to the sprayer booms. On a sprayer with manual controls, adjust the pressure switch. On an automatic controller, open the butterfly valve until it is full open.
2. Shut the manual pressure adjustment valve down so the pressure is about 20 PSI greater than the pressure you will spray at. The pressure the spray will be applied at is determined when calibrating sprayer. Refer to the Application Guide.

With this valve set, it will decrease the flow through the electric ball valve and reduce the sensitivity of the pressure adjustment switch.

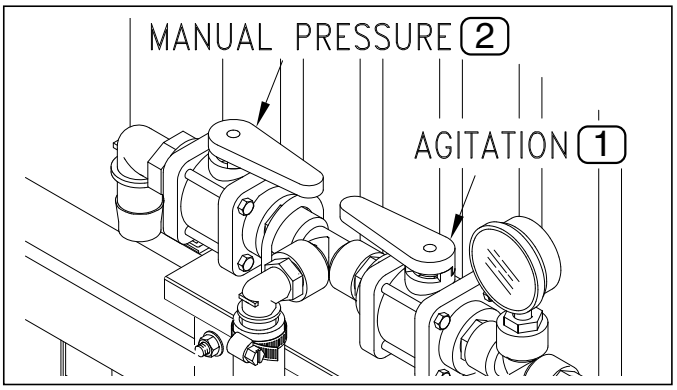


Figure 10 15783
Agitation/Manual Pres. Valves

Speed Calibration

3P300 sprayers may include a Raven SCS 440 controller, and the SCS 440 requires a speed sensing input, a new or existing wheel sensor or radar.

For a sprayer with an SCS 440, perform the speed calibration procedure from the Raven SCS 440 manual, then resume at **"Rate Calibration**" on page 23 in this manual.

For a sprayer without an SCS 440, use the following steps.

1. Measure off a 200 foot (or 100 meter) course in the area to be sprayed or in an area with similar surface conditions.
2. Select the engine throttle setting and gear that will be used when spraying. Allow ample approach distance to starting point so that tractor is at desired speed at start marker. Allow ample overrun area so that braking is not needed until exiting the course.
3. Hold the speed as you approach the "start" marker, and check the time required to travel through the course to the "end" marker.
4. Repeat the above procedure, and average the times that were recorded. Use these equations to determine the trial ground speed.

$$TrialMPH = \frac{CourseFeet \times 60}{ElapsedSeconds \times 88}$$

$$TrialKPH = \frac{CourseMeters \times 3.6}{ElapsedSeconds}$$

Example:
27 seconds over a 200 ft course

$$\frac{200 \times 60}{27 \times 88} = 5.05$$

Speed was: **5.05 mph**

Rate Calibration

The Raven SCS 440 system includes a flow rate sensor in the boom plumbing. This supports direct real-time readout of the current application rate.

For a sprayer with an SCS 440, perform the rate calibration procedures from the Raven SCS 440 manual.

For a sprayer without an SCS 440, perform the following steps.

1. Determine the nozzle rate (gpm or liters/min) at which your chemical should be sprayed. In determining the rate, and which spray nozzles to use with your sprayer, you need to know:

Parameter	Units	Your value	Data Source
Nozzle *SpacingIn or SpacingCm*	inch or cm		from sprayer configuration (page 18)
Target *GpA or LpHa*	g/ac or liters/Ha		From material container or supplier
Intended *Mph ok Kph*	mph or kph		From course trial above
Nominal application *psi or kg/cm^2*	psi or kg/cm^2		from GP slide chart

2. Using this information, calculate the nozzle rate, per nozzle, per a formula below:

$$NozzleGpM = \frac{GpA \times Mph \times SpacingIn}{5940}$$

$$NozzleLpM = \frac{LpHa \times Kph \times SpacingCm}{60000}$$

Example:
Nozzle Spacing: **20** in
Speed: **5.05** mph
Pressure: **30** psi

$$\frac{20 \times 5.05 \times 20}{5940} = 0.34$$

Nozzle Rate = **0.34** Gallons Per Minute

Using 0.34 gpm and pressure 30 psi, you would select a nozzle from your nozzle chart that comes closest to providing the desired output.

3. Turn on your sprayer and adjust the pressure.
4. While operating the sprayer at desired pressure, catch the discharge in the calibration container for one minute. For U.S. customary units, divide the number of ounces caught by 128 to determine gallons per minute (*GpM*) per nozzle. 128 fluid ounces equals one gallon.

$$NozzleGpM = \frac{SampleOuncesPerMinute}{128}$$

Example:
Sample: **44** U.S. Fluid Ounces in 1 minute

$$\frac{44}{128} = 0.34$$

Nozzle Rate = **0.34** Gallons Per Minute

Operations

General Notes For Field Operation

1. Lubricate the sprayer as needed. See "**Lubrication**" on page 50.
2. Hitch the sprayer to the tractor, making all electrical, hydraulic and (if applicable) PTO connections. See "**Hitching Tractor to Sprayer**" on page 12.
3. Make sure that the hand wash tank is full of clean water. Have soap available to clean any contaminated areas. ALWAYS wear personal safety equipment as shown at "**Wear Protective Equipment**" on page 2.
4. Check and clean, if necessary, pump, nozzles and Whirlfilters®.
5. Check the sprayer initially and periodically for loose bolts, pins and hose clamps. Check the hoses, pumps, valves and fittings for leaks.
6. When transporting the sprayer,
   DO NOT exceed 20 mph and
   DO NOT transport with chemical in the tank.
7. NEVER allow anyone to ride on the sprayer.

At the Field

8. Make sure all tank shut off valves are turned on.
9. Calibrate sprayer with water only, not chemical and water. Calibrate with the sprayer tank half full of water. Refer to the calibration procedures in the Application Guide.

IMPORTANT !

Make sure to read the label on the chemical compound that is to be applied. It is the law.

10. Consider how the chemical will be stored and how you will dispose of the chemical, according to the chemical label.
11. When calibrating, filling the tank, or working around chemicals, wear protective clothing that covers the body. See "**Wear Protective Equipment**" on page 2. Never open a container with your bare hands.
12. When filling the sprayer, it is better to mix the chemical in the field where it is to be applied. Position the sprayer 100 feet from any well or other water source before mixing the chemical.

CAUTION

Read and follow chemical manufacturer's instructions. Some chemicals and cause serious burns, lung damage and even death.

13. Safely and carefully add the chemical to the sprayer tank. By law rinsing of the used chemical container must be repeated three times. The container should then be punctured to prevent future use. An alternative is to jet-rinse or pressure rinse the container. When adding chemical, remain at least 100 feet from any water well or fresh water source. Follow chemical manufacturer's recommendations for safe handling of chemicals.
14. Adjust throttling valves on the boom valves, and the manual pressure adjustment valve (if applicable). Adjust the boom height required for the nozzles and spacing to be used. (Refer to nozzle tables in the Application Guide.)
15. Note nearby crops, houses, gardens, people, etc.
16. Apply spray when the wind is 5 mph/8 kph or less to minimize drift. Use nozzle tips with the largest practical openings. Operate the sprayer boom at the lowest practical height and lowest practical pressure.
17. If possible, work crosswise to the wind, starting from the downwind side of the field. This will prevent heading directly into the chemical fumes.
18. Drive at the same speed used for calibration. Refer to **Application Guide**. Keep your sprayer calibrated.
19. When turning at the end of a field, make sure you are correct on the rows so that the boom will not overlap on crop previously sprayed.
20. Check the sprayer initially and periodically for loose bolts, pins and hose clamps. Check the hoses, pumps, valves and fittings for leaks.
21. Check the condition of hoses and connections frequently. Release system pressure *before* working on the sprayer by shutting off the pump and the individual boom section switches. **Always** wear rubber gloves when making repairs or adjustments.
22. When you are finished spraying, empty the tank and flush the sprayer with water, including the pump, the nozzles and the bypass line from the throttling valves. Properly store the chemical emptied from the tank or dispose of it per label recommendations.

Operating Checklist

Each time the sprayer is used, check the following:

- ❑ Check wear and overall condition.
- ❑ Check the tractor's brakes to make sure they operate properly.
- ❑ Make sure all lights and turn signals are working properly.
- ❑ Lubricate sprayer as needed.
- ❑ Booms must be locked in place before transporting.
- ❑ Inspect tank. Make sure the hitch is adjusted so that the solution drains to the sump.
- ❑ Use safety equipment as listed on page 2.
- ❑ Fill with water and calibrate sprayer BEFORE adding chemical to the tank.
- ❑ Check the position of the ball valves in the plumbing to see if they are in the correct position.
- ❑ Check hoses, pumps and valves for any leaks.
- ❑ Check nozzle pattern for streaks and non-uniformity.
- ❑ Check the sprayer initially and periodically for loose bolts and pins.
- ❑ Follow "**Important Safety Information**" on page 1 of this Manual.
- ❑ Make sure the hand wash tank is full of clean water.

Using Hand Wash Tank

In the event of an accidental spill of chemicals on skin or in eyes, use the Hand Wash Tank to flush away chemicals. Use only potable or distilled water in the tank.

1. Make sure all persons working with or near the sprayer know where the tank is located and how to use it. In the event of a spraying accident, it may be necessary to find and operate the wash line with impaired vision.
2. Open the tank valve and use the hose to direct the clean water on all contaminated areas. Wash all contaminated areas of skin with soap and water. To flush chemicals from eyes, point the hose and water stream upward while lowering eyes into the stream of flowing water.
3. Close the tank valve and refill the hand wash tank with fresh water when finished. See "**Filling Hand Wash Tank**" on page 31.
4. Periodically refill the hand wash tank with fresh water. ALWAYS keep the hand wash tank clean.

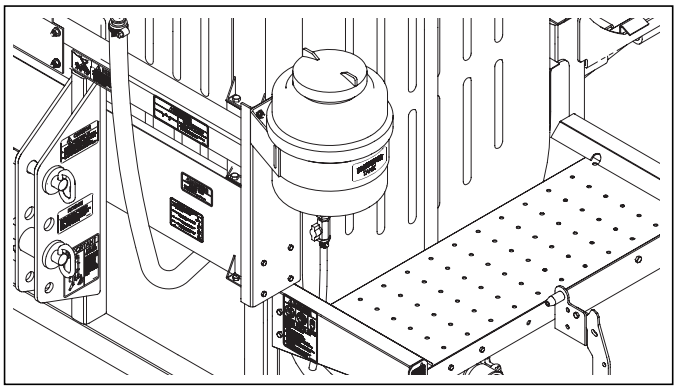


Figure 11 24136
Hand Wash Tank

Transporting

1. Park the sprayer in an open area where power lines, buildings, etc. will not come in contact with the folding boom.
2. If transporting empty, do at least fill the hand wash tank. See "**Filling Hand Wash Tank**" on page 31.
3. Check that the tractor is capable of lifting and transporting the sprayer. See table at right for sprayer configurations. These weights include some optional sprayer features. "Full" weights are for plain water.
4. Never allow riders when transporting the sprayer.
5. When transporting the sprayer, be sure to watch the height clearances for the folded boom to prevent damage and possible injury.

DANGER

Contact with electrical power lines by booms can cause death by electrocution.

6. Do not exceed 20 mph (32 kph) transporting the sprayer.
7. Do not transport sprayer while filled with chemical mixture.

Note: If a suitable water source exists at the field, transport the sprayer with main tank empty. The weight of the sprayer more than doubles when the main tank is full.

Sprayer Configuration	Weight
3P300, CF500, Empty	1951 lbs (885 kg)
3P300, CF500, Full	4448 lbs (2018 kg)
3P300, CF600, Empty	1996 lbs (905 kg)
3P300, CF600, Full	4494 lbs (2039 kg)

Plumbing Overview

Refer to Figure 12

A basic knowledge of how the sprayer is plumbed helps you understand how to operate your Great Plains Sprayer. Throughout this manual, the components on this diagram are described with the terminology labeling these components.

Five of the valves are labeled on the sprayer decals.

(1) Agitator Selector Valve

(2) Manual Throttle Valve

(3) Spray/Drain Selector Valve

(4) Product Valve (Optional, Tank Fill vs. Induct)

(5) Inductor Valve (Optional, On/Off)

Other key components are:

(6) Main Inlet Quick Connect & Valve (Normally Closed)

(7) Right Tank Inlet Shutoff (Optional, Normally Closed)

(8) Whirlfilter® Drain Valve (Normally Closed)

(9) Agitator Inlet Shutoff Valve (Normally Open)

(10) Sight Gauge Shutoff Valve (Normally Open)

(11) Inlet Whirlfilter®

(12) Main Tank Sump Port (Left and Right)

(13) Pump

(14) Solution Whirlfilter®

(15) Flow Meter

(16) Bypass Control Butterfly Valve

(17) 3-Way Boom Manifold Valves

(18) Agitation Gauge

(19) Inductor

Valves operate by moving their handles to point at the function on the decal, or toward the pipe desired on an otherwise unmarked selector valve. Shut-off valves are open when the handle is parallel to the piping, and closed when the handle is perpendicular.

In normal spraying operations, fluid is drawn from the main tank via the Left sump (12) and passes through the (13) pump.

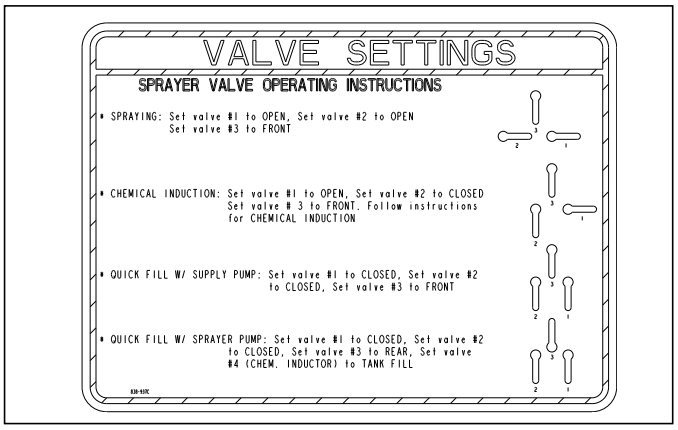


Figure 12 838-937C
Valve Setting Decal

From the pump, fluid passes through the Solution Whirlfilter® (14), which filters out or grinds up all undissolved chemical and solid particles. The fluid then passes through both the flow meter (15) and the bypass control butterfly valve (16).

The bypass control butterfly valve (16) controls how much fluid goes to the boom. This is regulated by the Raven SCS 440 controller. The fluid passes through the flow meter (15) and proceeds to the 3-Way Boom Manifold (17) valves. If a boom valve is on, the fluid passes to its respective boom section and is sprayed out the individual nozzles.

The agitation is set by adjusting the agitation pressure valve (1) while the pump is at operating speed. Refer to **Application Guide** to adjust the agitation.

The optional inductor (19) provides convenient pump-driven loading of concentrates into the main tank.

There are tank shut off valves ((3), (7), (9)) at each inlet and outlet. Use these to prevent spills and isolate any leaks.

To operate a correctly connected hydraulic pump, push the hydraulic lever in the “down” position. When you want to stop the pump, put the hydraulic lever in the “float” position.

IMPORTANT !

Do not move the hydraulic lever to the neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.

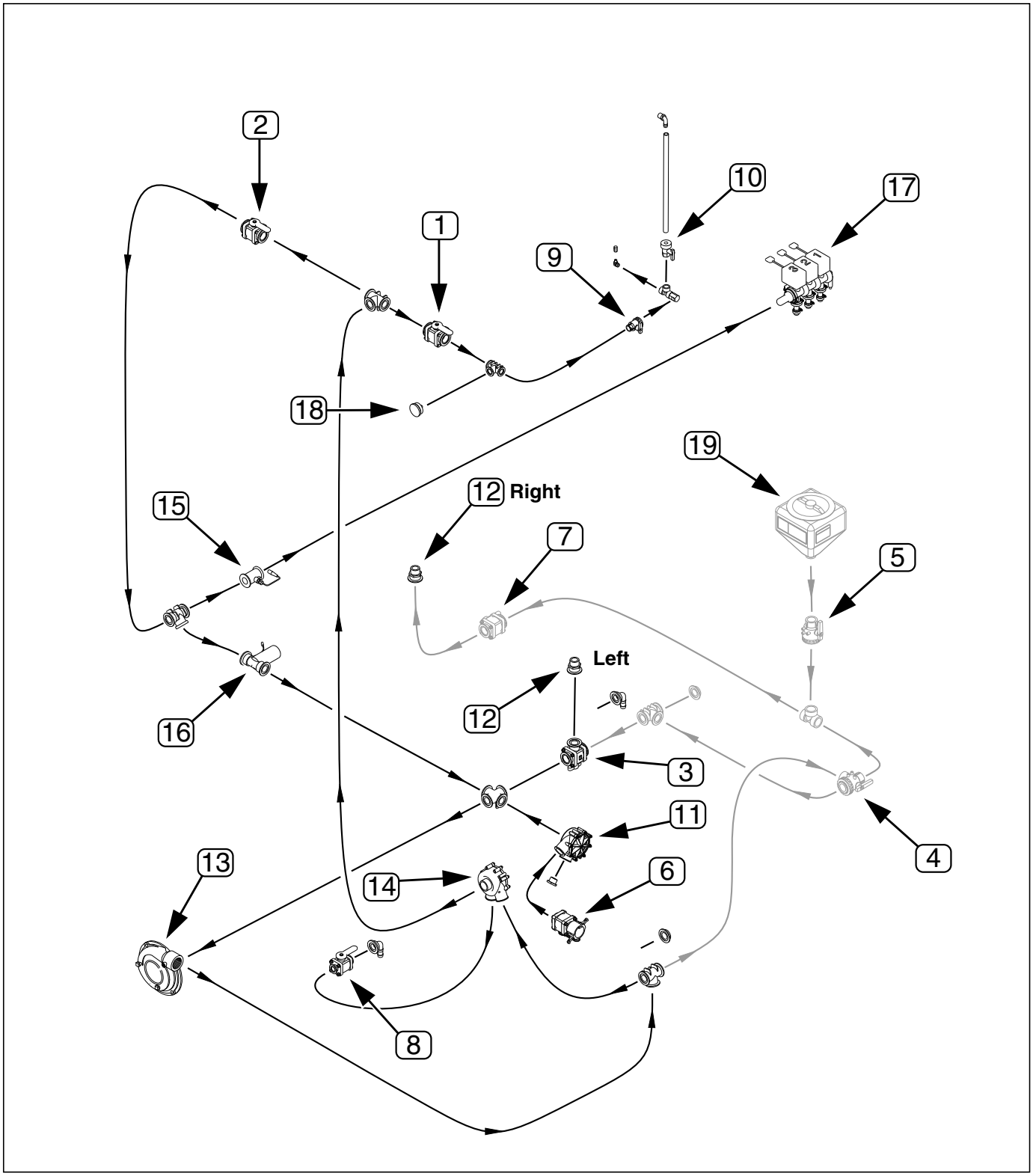


Figure 13
Sprayer Plumbing

28160

Operating Pump

Operating PTO Pump

DANGER

Rotating drive line contact can cause death. KEEP AWAY! Do not operate without guards attached and drive line securely attached at both ends.

WARNING

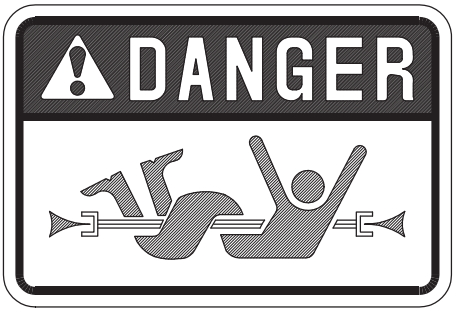
Never operate the PTO pump without the tractor PTO shield in place, and the pump torque bar firmly chained in place.

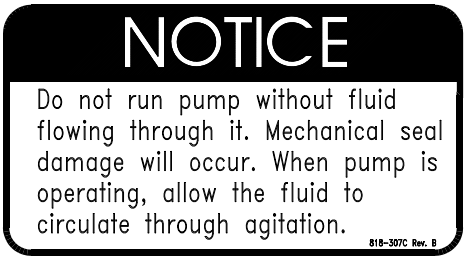
1. To operate a PTO pump, engage the PTO shaft slowly at the tractor's idle throttle position.
2. Slowly accelerate to the desired PTO RPM.
   - On a 540 RPM pump, the RPM of the PTO would be the speed at which the dead head pressure reaches 80 PSI or 540 RPM.
   - On a 1000 RPM pump, the RPM of the PTO would be the speed at which the dead head pressure reaches 80 PSI or 1000 RPM.

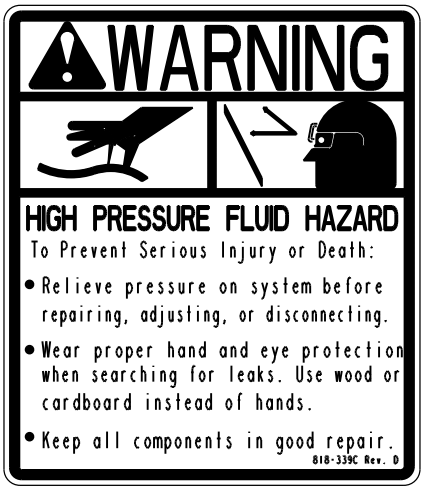
Operating Hydraulic Pump

1. To operate the hydraulic pump, first make sure that the hydraulic hoses are routed correctly so that the pump turns in the correct direction. See "**Hydraulic Pump Hook Up**" on page 15.
2. To run the pump, push the hydraulic lever in the "down" position.
3. When stopping the pump, push the hydraulic lever to the "float" position.

Note: Do not move the hydraulic lever to the neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.







Filling Tanks

Always fill the hand wash tank first.

Filling Hand Wash Tank

IMPORTANT !

Use only potable or distilled water in the hand wash tank. In the event of a chemical accident, it may be necessary to spray this water into your eyes.

Keep the hand wash tank clean, and free of mold and fungus. After a period of storage, scrub the inside using a mild detergent. Rinse thoroughly.

Plug or cap the hose when parked or stored, to prevent pests from entering, nesting and plugging the hose. Test the valve and hose when filling.

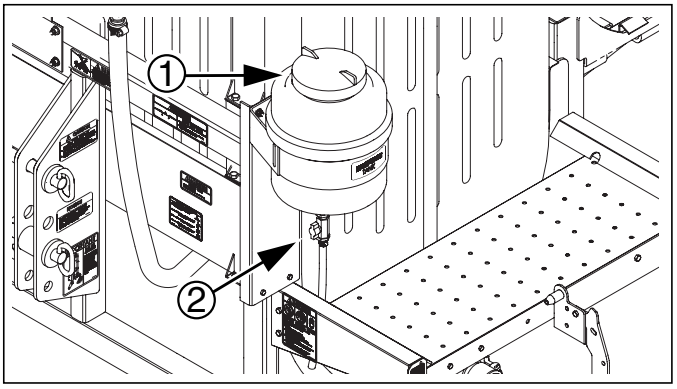


Figure 14 24136
Filling Hand Wash Tank

To fill the hand wash tank:

Refer to Figure 14

1. Open the filler cap ① and inspect the condition of the tank interior. If any debris, sediments, deposits or growths are seen, scrub and rinse the tank before use.
2. Unplug/uncap the hose and open the valve ②.
3. Begin adding clean water at the filler.

   If water flows freely out the hose, close the valve.

   if water does not flow freely out the hose, stop adding water, and clear the obstruction.
4. Close the valve and complete filling the tank.

Filling the Main Tank

Inspect Main Tank Agitator Jets

Refer to Figure 15

The main tank has a 3-port nozzle at the bottom. A portion of the materials to be applied are recirculated through the jets to evenly mix the chemicals and keep insoluble components in suspension.

Before adding water to the main tank, inspect the quad port to see that the ports point toward the tank center and far corners.

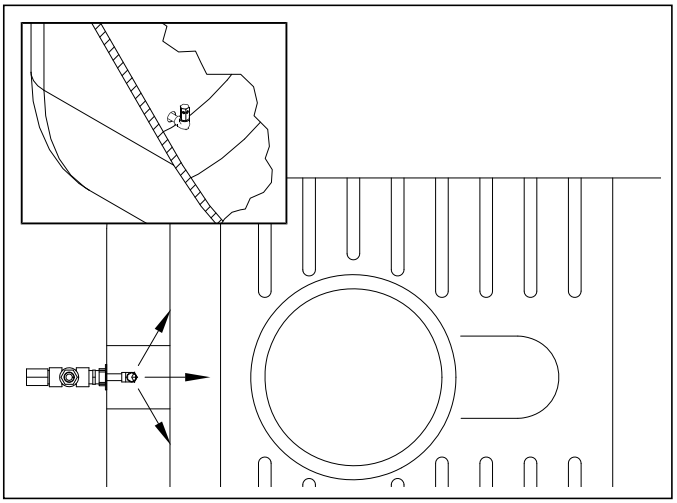


Figure 15 15768
Agitator Jet Orientation

Main Tank Filling Procedures

Refer to Figure 16

Your Great Plains Sprayer fills the tank from the bottom of the tank and uses a standard 2 inch cam-lock coupler [6] to connect to the freshwater hose.

The tank lid is vented and does not need to be opened for tank water fill operations.

CAUTION

When filling the sprayer tank, use a check valve or anti-siphon device to prevent the previous solution in the tank from infiltrating into the fresh water source and contaminating it.

IMPORTANT !

Never add chemicals to an empty tank. Before adding the chemical to the tank, make sure the tank is at least one half full. The concentrate should not be poured into an empty tank. Add chemicals at the field. See page 35.

Note: **Tank Straps**
The tank straps that wrap around the sprayer tank may become loose after the first few hours of operation. This occurs when the tank settles in the saddle. Polyethylene tanks are especially susceptible to this. Retighten the tank straps to secure the tank.

1. Check that the hand wash tank is full.

Refer to Figure 13 on page 29

2. Check that shutoff and cleanout valves ([6] - [10]) are in their “normal” positions for field operations (see table at right). Set all boom switches to OFF.

CAUTION

Do not add the chemical until the sprayer is in the field, just prior to spraying. When adding the chemical, follow the manufacturer’s instructions for mixing the spray solution in order to achieve the desired application rate.

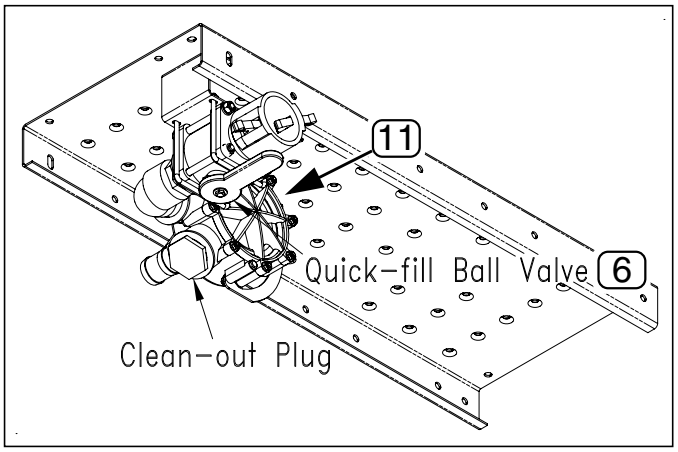
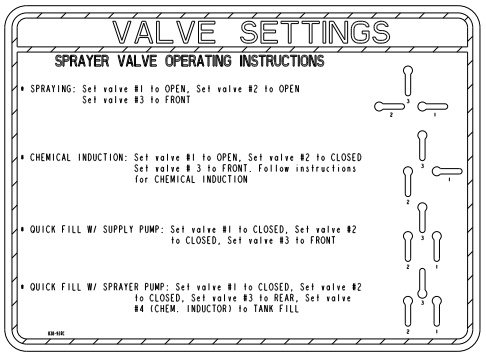


Figure 16 15772
Quick-Fill Ball Valve



Normal “Field” Valve Settings

Valve	Position
[1] Agitator Selector Valve	Partly OPEN
[2] Manual Throttle Valve	OPEN
[3] Spray/Drain Selector Valve	Front (SPRAY)
[4] Product Valve (Optional, Tank Fill vs. Induct)	CLOSED (Centered)
[5] Inductor Valve (Optional, On/Off)	CLOSED
[6] Main Inlet Quick Connect & Valve (Normally Closed)	CLOSED
[7] Right Tank Inlet Shutoff (Optional, Normally Closed)	CLOSED
[8] Whirlfilter® Drain Valve (Normally Closed)	CLOSED
[9] Agitator Inlet Shutoff Valve (Normally Open)	OPEN
[10] Sight Gauge Shutoff Valve (Normally Open)	OPEN

Main Water Fill Using Sprayer's Pump

Note: Use of the sprayer's own pump to fill the tank is possible only when the optional inductor is installed. Tank Fill relies on valves and plumbing supplied with the inductor.

Refer to Figure 17, Figure 18, and Figure 13 on page 29

Note: The sprayer's own hydraulic or PTO pump is a centrifugal type, and may be run with downstream valves closed.

Note: The sprayer's own hydraulic or PTO pump may require priming if the water level at the source has no pressure and is below the sprayer.

Steps 1 and 2 are on page 32.

3. Close the ball valve 6 at the main tank inlet.
4. Set Agitator valve 1 to OFF.
5. Set Manual Throttle valve 2 to ON.
6. Set tank Left Sump valve 3 to REAR (selecting hose from inductor).
7. Set inductor Product valve 4 to TANK FILL.
8. Connect the supply hose to the quick-fill Cam-Lock coupler 6.
9. Turn on the water.
10. Open the quick-fill ball valve 6.
11. Start the sprayer pump.
12. Stop filling by first stopping the pump, then closing the inlet valve 6.

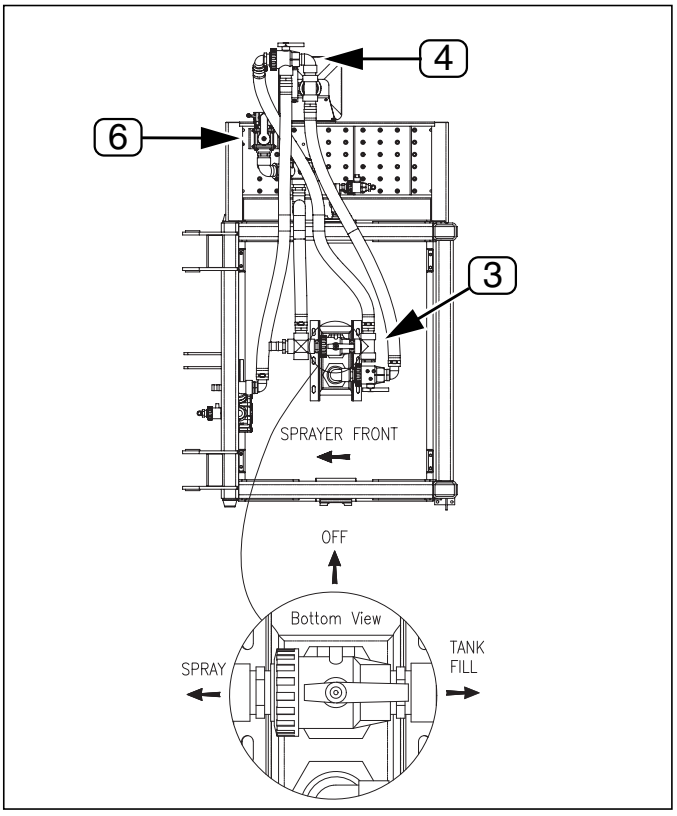


Figure 17
Sump Valve for Self-Fill

15920

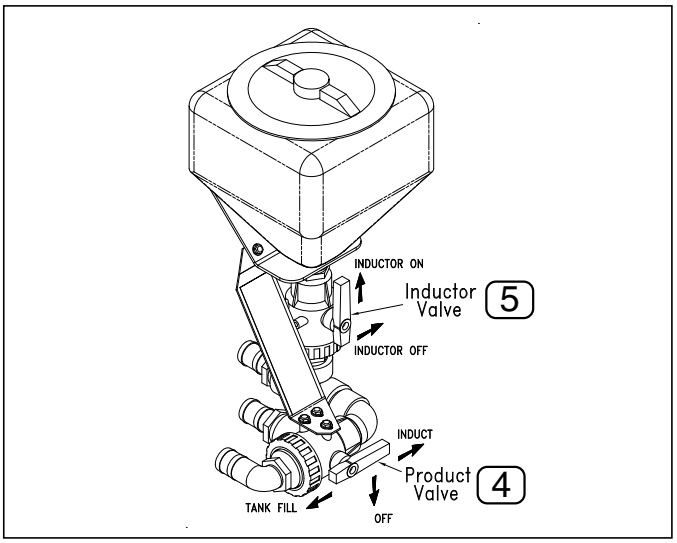


Figure 18
Product and Inductor Valves

15802

Main Water Fill Using Supply Pump

WARNING

If relying on gravity, make sure the supply tank is higher than the sprayer tank.

If relying on an external pump, make sure there is sufficient pressure at the tank inlet (nominally, at least 10 psi).

Failure to do so can cause back-flow from the sprayer tank causing sickness, serious injury or death from water contamination.

IMPORTANT !

If the supply pump at the water source is a positive displacement type, do not start it until after opening the ball valve 6 at the inlet.

Steps 1 and 2 are on page 32.

Refer to Figure 13 on page 29

3. Close the ball valve 6 at the main tank inlet.
4. Set Manual Throttle valve 2 to ON.
5. Set tank Left Sump valve 3 to FRONT (selecting hose from Inlet Whirlfilter).
6. Connect the supply hose to the quick-fill Cam-Lock coupler 6.
7. If using gravity or a pump that is *not* positive displacement, turn on the water source.
8. Open the quick-fill ball valve 6.
9. If using a positive displacement pump, turn it on.
10. When the tank is filled to the required level:

    If using gravity or a pump that is not positive displacement, close the inlet ball valve 6, then shut off the water source.

    If using a positive displacement pump, shut off the pump, and then close the inlet ball valve 6.

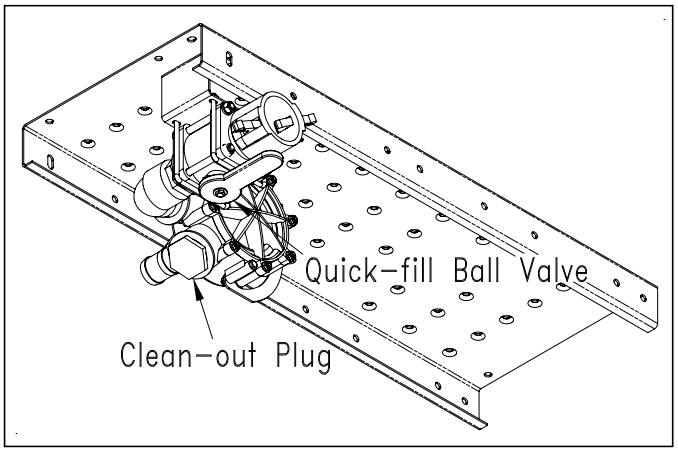
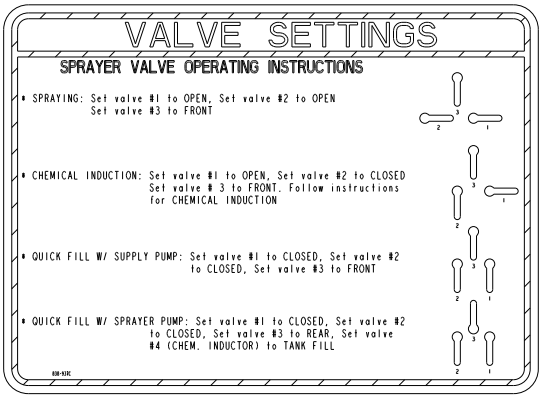


Figure 19 15772
Quick-Fill Ball Valve



Adding Chemicals

Chemicals may be added at the tank top, or by using the optional inductor.

1. Check that the hand wash tank is full of fresh potable or distilled water.
2. Before you add the chemical to the tank, make sure the tank is at least one half full of water. Never add chemicals to an empty tank. Do not add water after adding chemicals. Make sure the freshwater hose is disconnected and the inlet shutoff closed.

Refer to Figure 13 on page 29

3. Check that shutoff and cleanout valves (6 - 10) are set to their "Normal" field positions (see table on page 32). Set all boom switches to OFF.
4. Park the sprayer so that you will be facing downwind when adding chemicals at the lid or at the inductor.
5. Keep the spray solution away from all skin. Wear protective clothing and goggles. If the solutions comes in contact with the body, wash off the contaminated area with soap and water.
6. *Do not* smoke while handling chemicals.
7. Store or dispose of unused chemicals as specified by the chemical manufacturer.
8. Dispose of empty chemical containers properly. By law rinsing of the used chemical container must be repeated three times. Puncture the container to prevent future use. An alternative is to jet-rinse or pressure rinse the container.

CAUTION

If using liquid fertilizer, or any other chemical corrosive to brass, install a Great Plains 507-034V gauge protector at the inlet of the agitation gauge 18. Failure to do so results in corrosion, eventually causes the gauge to fail, and chemical then leaks under pressure from the gauge.

CAUTION

Do not add chemicals until you are at the field, just prior to spraying. When you add a chemical, follow the manufacturer's instructions for mixing the spray solution in order to achieve the desired application rate.

CAUTION

Read the manufacturer's label carefully before handling chemicals.

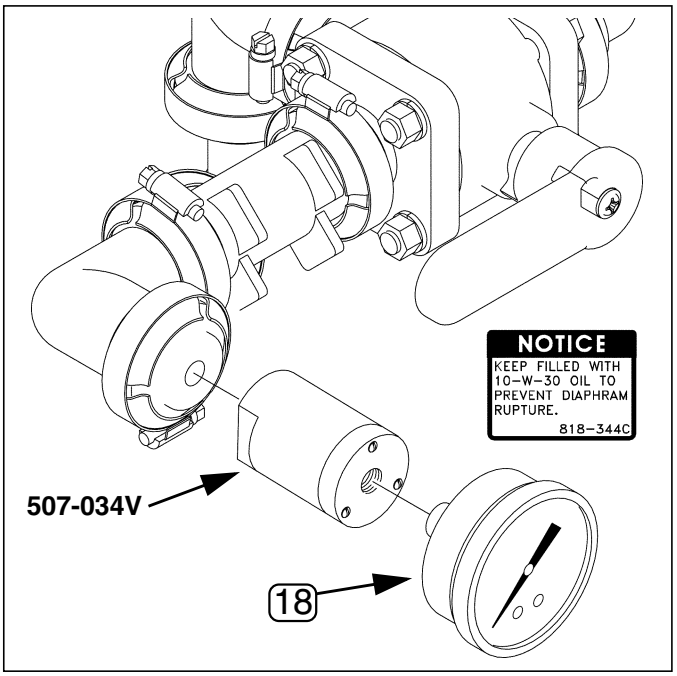


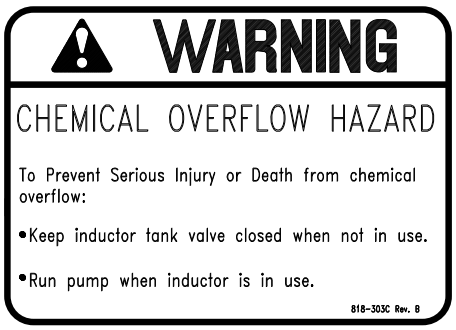
Figure 20
Gauge Protector

27297

Inducting Chemicals (Option)

IMPORTANT !

Always turn pump on before opening inductor shutoff valve (at step 15). Always turn pump off after closing inductor shutoff valve (at step 17). If the pump is not running, the tank can drain back through the inductor. The inductor lid is vented, and cannot prevent overflow.



Refer to Figure 13 on page 29

9. Check that the
   7 inductor-outlet/tank-inlet valve
   is open.

Refer to Figure 21 and Figure 13 on page 29

10. At the inductor, set valves:
    5 to OFF and
    4 (product valve) from OFF to INDUCT.
11. At the sprayer front, set valves:
    1 (Manual Pressure) to OPEN, and
    2 (Agitation) to OPEN.
12. Under sprayer, set valve:
    3 to Rear (FILL, selecting inductor).
13. Start the pump.

Note: The pump recirculates tank contents through a venturi beneath the inductor tank.

14. Open the inductor lid.

Note: The inductor lid is vented, and the inductor may be operated with the lid on or off.

15. Open the inductor shutoff valve 5 and inspect to ensure that there is no back-flow of water from the tank into the inductor. Close the valve.
16. Add the chemical to the inductor tank. Put the lid on the tank.
17. Open the inductor shutoff valve 5. When the required amount of chemical has been added, and the inductor tank is empty, close the inductor shutoff valve 5.
18. Turn the pump off.
19. Set the Product valve 4 to OFF (Centered).
20. Set the left tank inlet valve 3 to OFF (Centered) or Front (SPRAY).

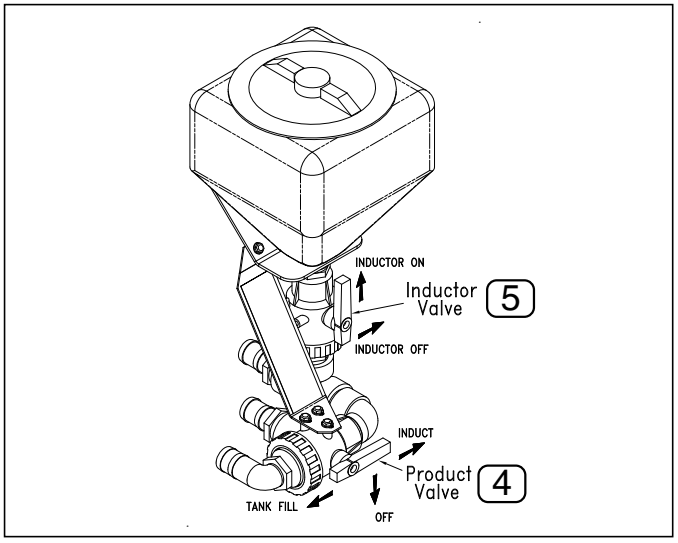


Figure 21 15802
Product and Inductor Valves

Foam Marker Tank Fill

Consult the separate manual provided with the marker system for information on selecting, mixing, loading and applying marker foam.

Agitation

The agitator bleeds off some of the material flow and recirculates it through orifices at the bottom of the tank. It helps maintain constant concentration with materials that might otherwise tend to precipitate, sediment or stratify.

Refer to Figure 22

The Agitation Valve [1] controls the amount of recirculation. Use the agitation gauge to set a reference pressure for the agitation.

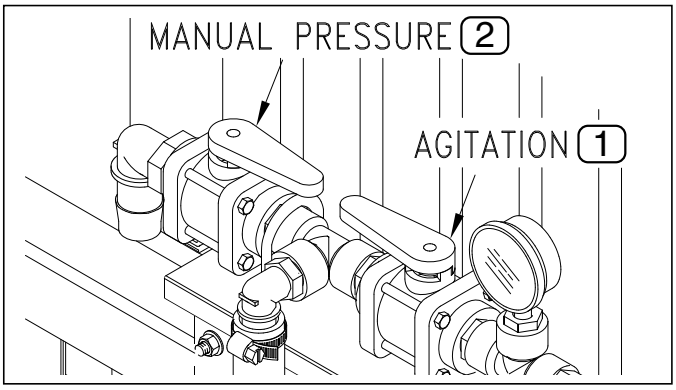


Figure 22
Agitation/Manual Pres. Valves

15783

Unfolding and Folding Booms

This is an overview of boom operations. For full details, see the Boom Operator manual.

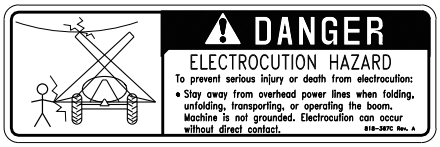
On the standard 3P300 sprayer, each boom is on a separate hydraulic circuit. With either electro-hydraulic option, the booms are on a common circuit but may be operated independently. With optional controls, the color code is:

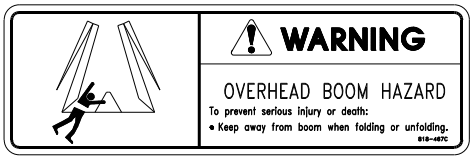
Control	Function
Green	Left Boom
Red	Right Boom

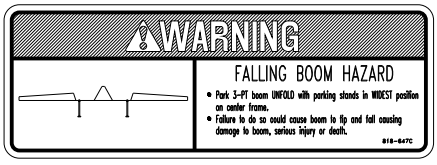
Regardless of circuit connections, boom sides may be folded and unfold individually or simultaneously. There is no risk of arm interference.

In addition to folding for transport and storage, the initial movement during folding is a slight boom tilt, which may be used to clear obstacles, particularly during turns.

An arm may be left folded during a field pass if needed. Be sure to shut off the nozzles for that side.







Hydraulic Elevator Option

Raise and lower to the desired boom height using the tractor hydraulics. Make sure the boom doesn't settle hydraulically (lower in height) during the operation of the sprayer. With optional controls, the color code is:

Control	Function
Yellow	Elevator

Field Operation

Auto-Control Spraying Passes

With maintenance up to date, Raven SCS 440 set up, calibration complete, water material loaded, and agitation adjusted; typical field operation includes these steps:

1. Check that fill, drain and clean-out valves (6, 7, 8) are closed.
2. 1 and 2: as adjusted
   3: to Front (SPRAY)
   4 and 5: closed
   9 and 10: open
3. Line up at field edge.
   Unfold booms.
4. Set 3-point or elevator to desired canopy clearance.
   Set elevator switch off, or circuit to neutral, to hold height.
5. Raven SCS 440:
   FLOW CONTROL: switches as desired.
   POWER: ON
   MASTER: OFF
   Boom sections: ON.
6. Pump: on
7. Raven MASTER: ON
   As spray reaches nozzles, accelerate to spraying speed.
8. At pass end:
   MASTER: OFF (pump may be left on)
   Raise one or both boom sides as needed for turns.
9. Lower boom(s).
   MASTER: ON
10. Monitor the SCS 440 to confirm that desired rates are achieved. Check sight gauge to confirm.

Manual Control Spraying Passes (2007-)

With maintenance up to date, calibration complete, water material loaded, and agitation adjusted; typical field operation includes these steps:

1. Check that fill, drain and clean-out valves (6, 7, 8) are closed.
2. 1 and 2 as adjusted
   3 front/spray
   4 and 5 closed
   9 and 10 open
3. Line up at field edge.
   Unfold booms.
4. Set 3-point or elevator to desired canopy clearance.
   Set elevator switch off, or circuit to neutral, to hold height.
5. Raven SCS 313:
   POWER: ON
   MASTER: OFF
   Boom sections: ON.
6. Pump: on
7. Raven MASTER: ON
   As spray reaches nozzles, accelerate to spraying speed.
8. At pass end:
   MASTER: OFF (pump may be left on)
   Raise one or both boom sides as needed for turns.
9. Lower boom(s).
   MASTER: ON
10. Monitor SCS 313 pressure reading, and monitor the sight gauge to confirm that material is being consumed at the expected rate.

Parking

The following list should be followed when unhitching the sprayer. See "**Storage**" on page 40, for more information about long term storage of the sprayer.

1. Park the sprayer in an open area where power lines, buildings, etc. will not come in contact with the folded boom.
2. Fold the spray booms.
3. Drain the sprayer tank of any excess water or chemical. Dispose of or store chemical properly by instructions on the chemical label.
4. Securely attach the boom parking stands onto the Great Plains boom (refer to the boom operator manual for the mounting instructions). Lower and pin the front boom stands so they are the same level as the parking stands on the boom. Secure the pins in the front stands with the wire attached to each pin, refer to Parking Stand.
5. Park the sprayer on a flat, level area where wind cannot blow it over and preferably where it is sheltered from direct sunlight.
6. If the ground is soft, place a board or plate under the parking stands to widen the ground contact area. Make sure the sprayer remains level.
7. Lower the 3-Point on the tractor and bring the boom to rest on the support.
8. Unhook the PTO pump or unplug hydraulic lines from the hydraulic pump, which ever is applicable.
9. Disconnect all electrical connections.
10. Remove the 3-Point pins from the tractor and pull the tractor away from the sprayer.

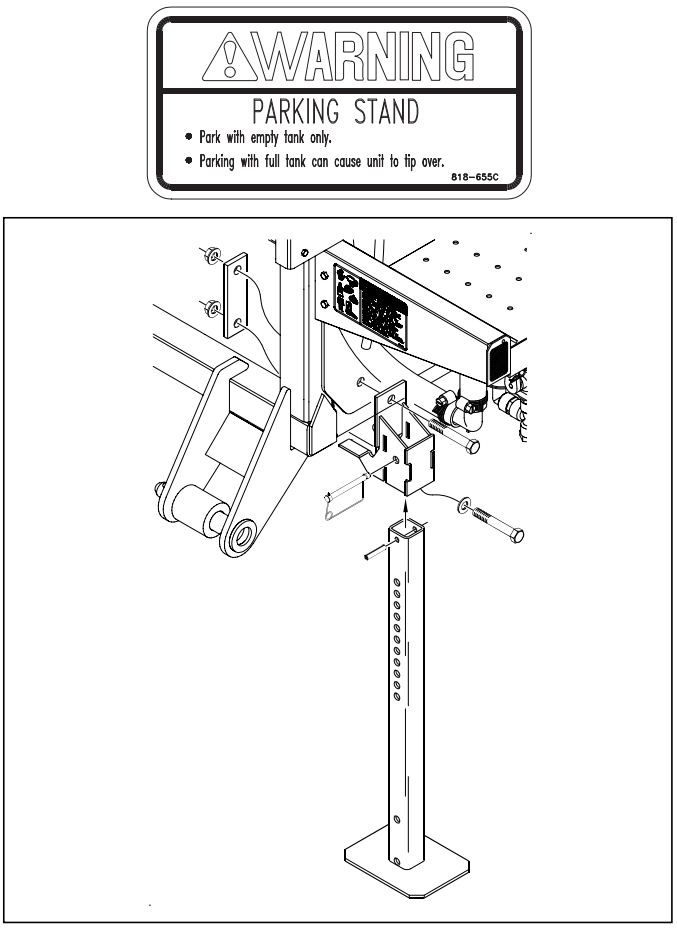


Figure 23
Parking Stand

14672

Storage

1. Empty solution from the tank, clean the chemical inductor (if included), and store or dispose of the chemical as recommended by the manufacturer's chemical label.
2. Flush the entire sprayer system with clean water.
3. Clean out Whirlfilters®. See "**Whirlfilter® Clean-Out**" on page 44.
4. Circulate 3 - 5 gallons (11-19 liters) of antifreeze (Great Plains strongly recommends the use of recreational vehicle antifreeze) through the system including the pump, hoses and nozzles.
5. A cast iron pump must be either full of RV antifreeze or completely empty of all liquid to avoid corrosion. If the contents of the pump is unclear it is advisable to drain the pump, remove it, and place it in a warm dry, environment during the winter.

IMPORTANT !

Regular antifreeze is harmful or fatal to animals and humans. Use carefully according to the label's instructions. We strongly recommend the use of recreational vehicle (RV) antifreeze which does not exhibit these harmful side effects.

6. Remove nozzles, disconnect the control box, and place them indoors with the pump.
7. Wash off the exterior of the sprayer thoroughly using a safe solvent or soap and water.
8. Inspect all parts of the sprayer for wear and rust. Repair and paint parts as necessary.
9. Fully retract all cylinders to prevent rust on exposed rods. Where cylinders do not fully retract, either disconnect rod ends to allow retraction, or coat exposed rods with grease.

IMPORTANT !

Remove grease prior to next use to prevent seal damage.

10. Store the sprayer in a dry area away from direct sunlight, where children do not play.

Adjustments

General Field Adjustments

Boom Height

After calibrating the sprayer for the specific nozzle that will be used at a desired pressure and tractor speed, the main field adjustment is the boom height. See "**Hydraulic Elevator Option**" on page 37. Depending on which type of nozzle is being used, set the boom height so that the correct overlap for that specific nozzle is achieved. If the crop canopy is taller in some fields than others adjust the boom height accordingly. Refer to the Nozzle Charts in the Application Guide located in this manual to determine the height of the boom needed.

EXAMPLE:
A 2.5 Metercone nozzle at 20 inch spacing is being used. From the Nozzle Chart (refer to the Application Guide), a height of 19 to 21 inches above the top of the crop is required. If the crop is 6 inches off the ground, the boom height should be set to 25 to 27 inches off the ground.

Nozzle Pressure

The SCS 440 auto control system regulates pressure automatically. With manual control (SCS 313, 2007- sprayers only), nozzle pressure may require some field adjustment. As the tank level decreases, boom pressure may need to be adjusted to keep the pressure at the calibrated level. Watch the SCS 313 pressure gauge and be aware of changes in the pressure.

Tank Straps

The tank straps that wrap around the sprayer tank may become loose after the first few hours of operation. This occurs when the tank settles in the saddle. Polyethylene tanks are especially susceptible to this. Retighten the tank straps to secure the tank.

Pressure Adjustments

One of the most important areas of controlling the sprayer accuracy is to have the proper pressure when spraying. The pressure is determined when the sprayer is calibrated. Refer to Calibration Procedures in the Application Guide.

The electric butterfly valve is used to adjust the pressure to the booms. It is controlled automatically by the SCS 440, and manually by a switch on the SCS 313. The boom pressure is displayed by the boom pressure mode of the SCS 440, and by the gauge on the SCS 313.

To adjust the pressure on SCS 313, hold the pressure adjust toggle switch up for more pressure, down for less pressure.

As the tank level decreases, the boom pressure may change. SCS 440 compensates automatically. On SCS 313, check boom pressure gauge frequently and make sure that the pressure doesn't change. Generally, the boom pressure will need to be adjusted up slightly when the tank level decreases.

Refer to Figure 24

When the manual pressure adjustment valve is wide open, the pressure adjust switch is very sensitive. To decrease the sensitivity of the pressure adjust, set the manual pressure adjustment valve. See "**Manual Pressure Valve**" on page 21.

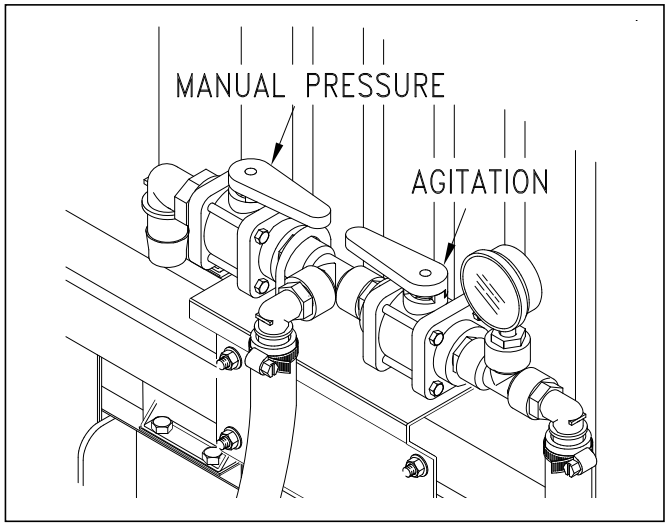


Figure 24 15783
Pressure Valves

Troubleshooting

Problem	Problem Area	Specific Checks	Solutions
Pressure decreasing	Between gauge and liquid supply	Pump wearing	Rebuild or replace pump
		Plugged suction or pump to pressure head hose	Clean hose and reduce cause of clogging
		Plugged Whirlfilter	See "**Whirlfilter® Clean-Out**" on page 44.
		Plugged gauge	Remove the quick disconnect fitting and flush gauge protector
Pressure fluctuating	Between pump outlet and liquid	Check suction hose & fittings for air leaks. Air in system is indicated by buffs of air at nozzles	Remove obstruction from clogged area
		Vortex in tank suction	Align agitators properly
		Cracked pump housing	Replace pump housing
Pressure increasing	Between gauge and nozzle	Nozzle screens clogged	Clean screens
		Nozzle orifices plugged	Remove material with soft brush or air
		Boom hoses becoming clogged	Remove obstruction from clogged area
		Boom hoses pinched	Use cable ties to position hose so it will not kink
Pressure cannot increase	Pump or electric ball valve	From nozzle charts check liquid demand against pump capacity (nozzle requirement + agitation requirement)	Reduce swath width by nozzle reduction; install smaller nozzles and drive at a lower rate of speed
		Electric ball valve or gauge not functional	Replace or repair
		Pressure adjust switch faulty	Test switch & replace if faulty
		Fuse is out in control box	Replace fuse
		Manual pressure adjustment valve not all the way open	Open the manual pressure valve all the way and allow the electric ball valve to govern the pressure
No pressure	Plumbing	Tank shut-off valves off	Make sure all tank shut-off valves are open
		Loose fittings	Tighten fittings so pump can prime
		Collapsed suction hose to pump	Replace hose
		Obstruction in suction hose or tank	Remove obstruction
No pressure	Pump	Hydraulic pump running in the wrong direction	Switch hydraulic hoses in the tractor outlet
		PTO pump coupler loose	Tighten PTO coupler

Problem	Problem Area	Specific Checks	Solutions
Pressure cannot decrease	Pump or electric ball valve	Tank agitation restricted	Check that the agitator valve is open and that the liquid is being agitated
Liquid will not induct	Chemical Inductor	Make sure the valve below the inductor tank is open	
		Make sure the pump is in operation and has prime	
		Make sure the venturi bypass valve is open	
Inductor overflow	Chemical Inductor	Close valve below inductor tank until pump is running, has pressure and venturi valve is open	

Maintenance and Lubrication

Maintenance

Proper servicing and adjustment is the key to long life for any implement. With careful and systematic inspection, costly maintenance, repairs and down time can be avoided.

DANGER

Read and follow chemical manufacturer's instructions. Some chemicals and cause serious burns, lung damage and even death.

WARNING

Before working on, servicing or making adjustments on sprayer, always disengage power, shut off tractor engine, make sure all moving parts have stopped, and all pressure in the system is relieved.

- *Always wear rubber gloves when making repairs or adjustments.*
- *Make sure all safety equipment mentioned in "**Wear Protective Equipment**" on page 2, are stored in an easily accessible place but protected from potential contamination from dust or chemicals.*

General Information

If equipment is to be used in freezing or near freezing conditions, protect pump and plumbing system by thoroughly draining liquid and pumping antifreeze (Great Plains strongly recommends the use of recreational vehicle antifreeze) solution through the plumbing system.

The cast iron pump must be either full of RV antifreeze or completely empty of all liquid to avoid corrosion. If the contents of the pump is unclear it is advisable to drain the pump, remove it, and place it in a warm dry, environment during the winter.

Check the condition of the sprayer hoses and clamps. Fix all leaks by tightening hose clamps or fittings. If the pump is leaking, refer to the pump maintenance section. If the hoses are dragging when the sprayer is operated use cable ties to fix their position. Make sure the hoses do not bind or kink when the boom is folded or raised. If so, route the hoses to prevent kinking and binding. If hoses are damaged, replace as necessary. Periodically check for loose bolts and tighten.

Inspect all parts of the sprayer for wear and rust. Repair and paint parts as necessary.

Equipment Cleanup

Clean nozzles with a low pressure (less than 30 psi) air hose. Replace worn nozzle parts. Haul a supply tank of water for field cleaning of the spray tank and booms. NEVER wash tank out in the yard or at a car wash.

Dispose of leftover chemical in the same manner described on the manufacturer's label of the chemical last used in the sprayer. Rinse out the tank and spray the rinse water on the last field that was sprayed.

Flush the sprayer with fresh water and spray the water in the field that was last sprayed. While the sprayer is being flushed at the field, turn the boom section switches "on" to flush the nozzles, then turn them "off" to flush out the bypass lines. Repeat this procedure several times.

Whirlfilter® Clean-Out

There are two Whirlfilters® on the Great Plains Sprayer. One filters the water entering the tank and the other filters the chemical solution being sprayed.

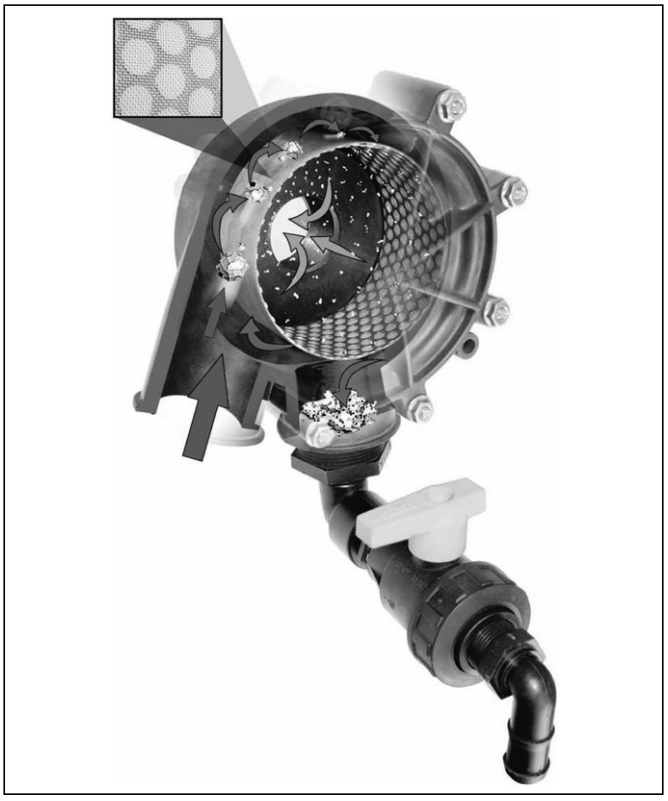


Figure 25 28162
WhirlFilter Operation

Solution Whirlfilter® Clean-Out

Refer to Figure 26 and Figure 13 on page 29

1. Fill the sprayer tank with water and turn the pump on.
2. With the pump running, slowly open the clean-out valve (8) and allow the grit to flow out into a bucket. Clean out the solution Whirlfilter® only when the sprayer tank is filled with water and no chemical has been added.
3. Close the clean-out valve and turn off the pump.
4. Dispose of the grit and water in the same manner described on the manufacturer's label of the latest chemical used in the sprayer.

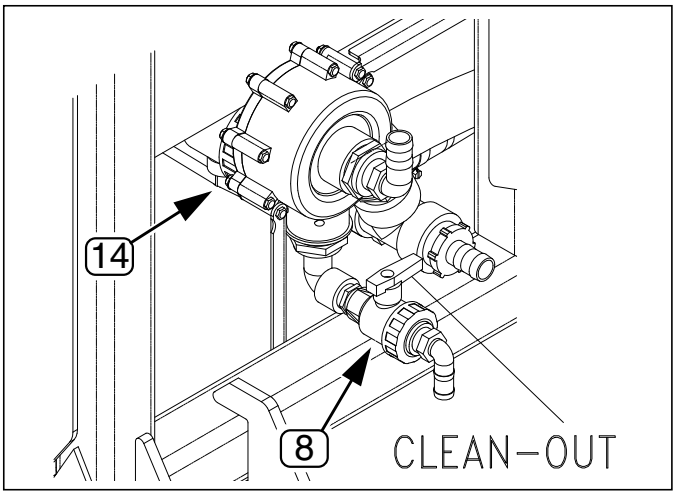


Figure 26 15787
Whirlfilter Clean-Out Valve

Inlet Whirlfilter® Clean-Out

Refer to Figure 27 and Figure 13 on page 29

1. Start with an empty sprayer tank.
2. Position a bucket under the plug in the sump of the Whirlfilter® and allow the grit to fall out.
3. Screw the plug back in using pipe thread sealant to seal the plug.
4. Dispose of the grit and water in the same manner described on the manufacturer's label of the latest chemical used in the sprayer.

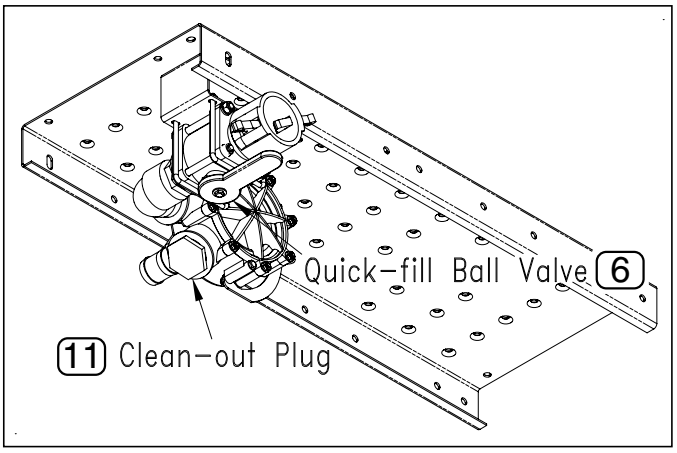


Figure 27 15772
Quick-Fill Ball Valve

Pump Maintenance & Repair

Great Plains PTO Pump

The Great Plains pump is designed for long life and service. After some years, a mechanical seal may weep slightly, but if it starts to drip, the pump needs disassembly. Before disassembling the pump be sure to flush it with fresh water. The Parts manual has current components part numbers.

Refer to Figure 28

Before removing a leaking pump, run the pump with adequate water in the tank to diagnose the actual pump problem. If fluid leaks out between the front suction housing ⑤ and the rear volute housing ⑧, the housing gasket may be dried out. Give the gasket ⑥ adequate time to absorb moisture and swell up. If necessary, retighten the volute housing ⑧ by alternating on opposite sides until all nuts ⑨ are torqued to 16 - 18 ft.-lbs. It is a good practice to apply grease to both sides of the gasket ⑥ to prevent shrinkage.

If seal replacement is required:

1. Disassemble pump and clean all components.
2. Assemble the ceramic ring seat of the mechanical seal ⑦ into the volute housing ⑧ of the pump. Make sure the ceramic seat is positioned square into the volute housing.
3. Clean off any grease or dirt from pump shaft ⑩ and dry the shaft so the rubber bellows on the mechanical seal will adhere to the shaft properly when assembled.
4. Bolt up the pump input bearing housing (not shown) to the volute housing ⑧ using bolts ②, ③ and ④ with spacers (not furnished) for alignment and assembly of the shaft seal.
5. Assemble the seal ⑦ without its spring, on the pump shaft by pushing on the inside rubber portion of the seal using water as the lubrication. The graphite seal face should touch the white ceramic seat face. The rubber bellows adhering to the pump shaft should not protrude more than $^{1}/_{16}$in (1.6mm) beyond the stainless steel ring on the impeller side of the seal.
6. Assemble the seal's spring and the impeller, being careful not to move the mechanical seal that has been positioned on the pump shaft. Torque the impeller bolt ① 16-18 ft-lbs (22-24 N-m).
7. Remove the three bolts and spacers. Using gun grease, lubricate the gasket ⑥. Assemble the gasket ⑥ and suction housing ⑤ using bolts, flat washers and locknuts. Torque nuts 16 - 18 ft./lbs.

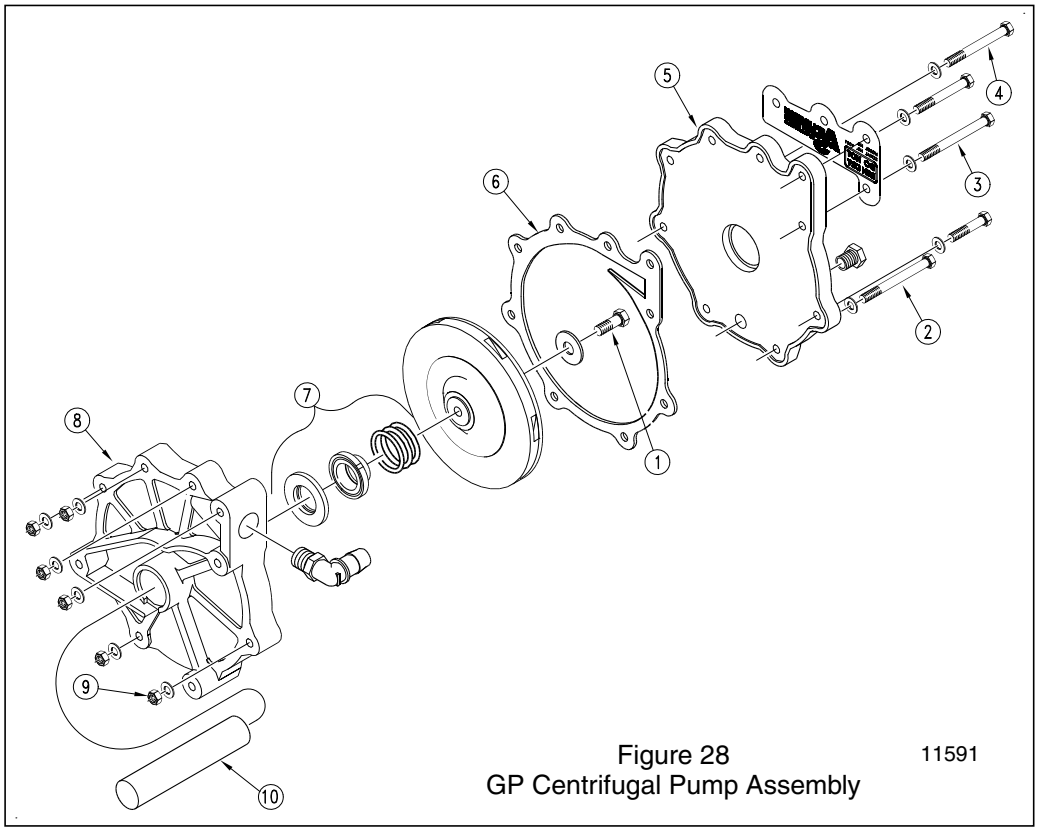


Figure 28 11591
GP Centrifugal Pump Assembly

Ace Pumps

The Ace pump is designed for long life and service. After some years, a mechanical seal may weep slightly, but if it starts to drip, the pump will have to be disassembled. Before disassembly, be sure to wash it out with fresh water.

If the pump leaks, before removal from sprayer, run the pump with adequate water in tank to diagnose the actual pump problem.

Ace Hydraulic Pump Seal Replacement

Refer to Figure 29

Ace Pump Disassembly

1. Remove four $^{5}/_{16}$in hex head cap screws ⑲ from rear of motor. Remove motor ⑱ and coupler.
2. Remove rear internal bearing snap ring ⑪.
3. Remove four $^{3}/_{8}$in x $^{3}/_{4}$in hex head cap screws ⑨ from mounting frame ⑧. Remove volute ②.
4. Remove $^{3}/_{8}$in lock nut ③ from shaft ⑯. Insert a flat file into impeller vane to hold stationary.

   CAUTION: Excess torque may cause damage to plastic impellers.
5. Press shaft ⑯ out of impeller ⑤ using one $^{5}/_{16}$in hex head cap screw from step 1. Remove impeller ⑤, key ⑮, and rotating seal member ⑥.
6. Press shaft/bearing assembly out of frame.
7. Remove stationary seal member ⑰ by prying out with screwdriver or pressing out from motor end of pump housing.
8. Remove o-ring ⑳ from shaft groove.

Note: If replacing only the pump seal:
a) Press the shaft /bearing assembly into frame.
b) Reinstall rear internal bearing snap ring.
c) Skip to Assembly step 8.

9. Press bearings off of shaft.
10. Remove forward internal bearing snap ring ⑪.

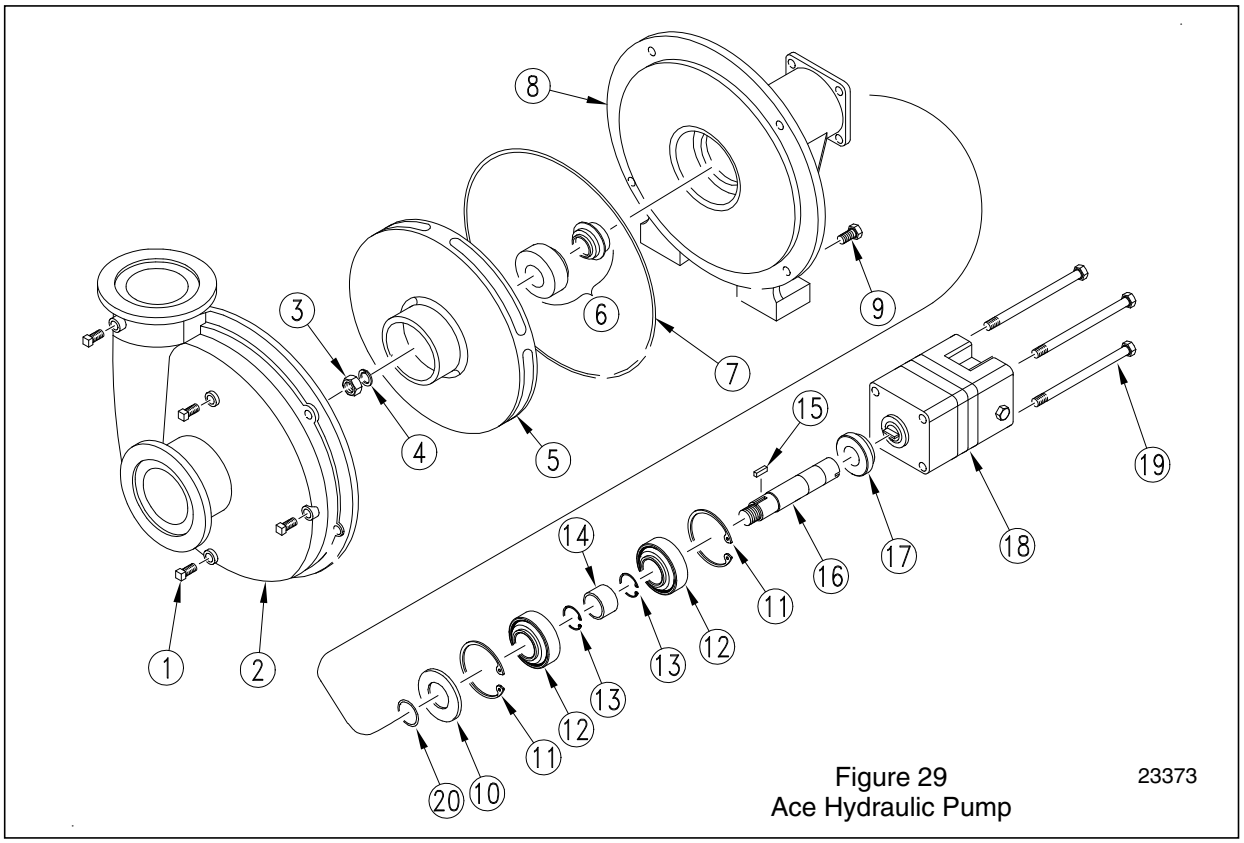


Figure 29
Ace Hydraulic Pump

23373

Ace Pump Assembly

Refer to Figure 30

1. Install forward internal bearing snap ring ⑪ in mounting frame ⑧.
2. Press in forward bearing ⑫ from rear side of mounting frame ⑧ to snap ring ⑪.
3. Install two external shaft retainer rings ⑬ with spacer ⑭ between on shaft ⑯.
4. Press shaft assembly through forward bearing ⑫ until forward shaft snap ring ⑬ rests against inner face of forward bearing ⑫.
5. Press rear bearing ⑫ over shaft ⑯.
6. Insert rear internal bearing snap ring ⑪.
7. Slide rubber slinger ⑩ over shaft ⑯ and push back to front bearing ⑫.
8. Clean old sealant from mounting frame seal bore.
9. Install o-ring ⑳ in shaft groove.
10. Apply non-hardening Type 2 Permatex or similar under stationary seal flange.
11. Place stationary portion of seal ⑰ over shaft ⑯ and press into seal bore cavity. Use a $1\frac{3}{8}$in ID pipe or PTO adapter to press seal flange evenly on all sides.
12. Install rotating portion of seal ⑥ over shaft ⑯ and o-ring ⑳ by hand. The two polished seal faces should face each other. Avoid contacting polished seal faces.
13. Insert key ⑮ in keyway ⑤ and install impeller ⑤ on shaft ⑯.
14. Place lock washer ④ and $\frac{3}{8}$in lock nut ③ on shaft ⑯ and tighten nut ③.
15. Replace volute o-ring or gasket ⑦, volute ②, and four $\frac{3}{8}$in x $\frac{3}{4}$in cap screws ⑨.
16. Position coupler in pump shaft slot and fill cavity surrounding coupler with grease.
17. Install motor ⑱ by aligning motor tang and coupler slot. Rotate motor ⑱ until nameplate faces up.
18. Install four $\frac{5}{16}$in cap screws ⑲.

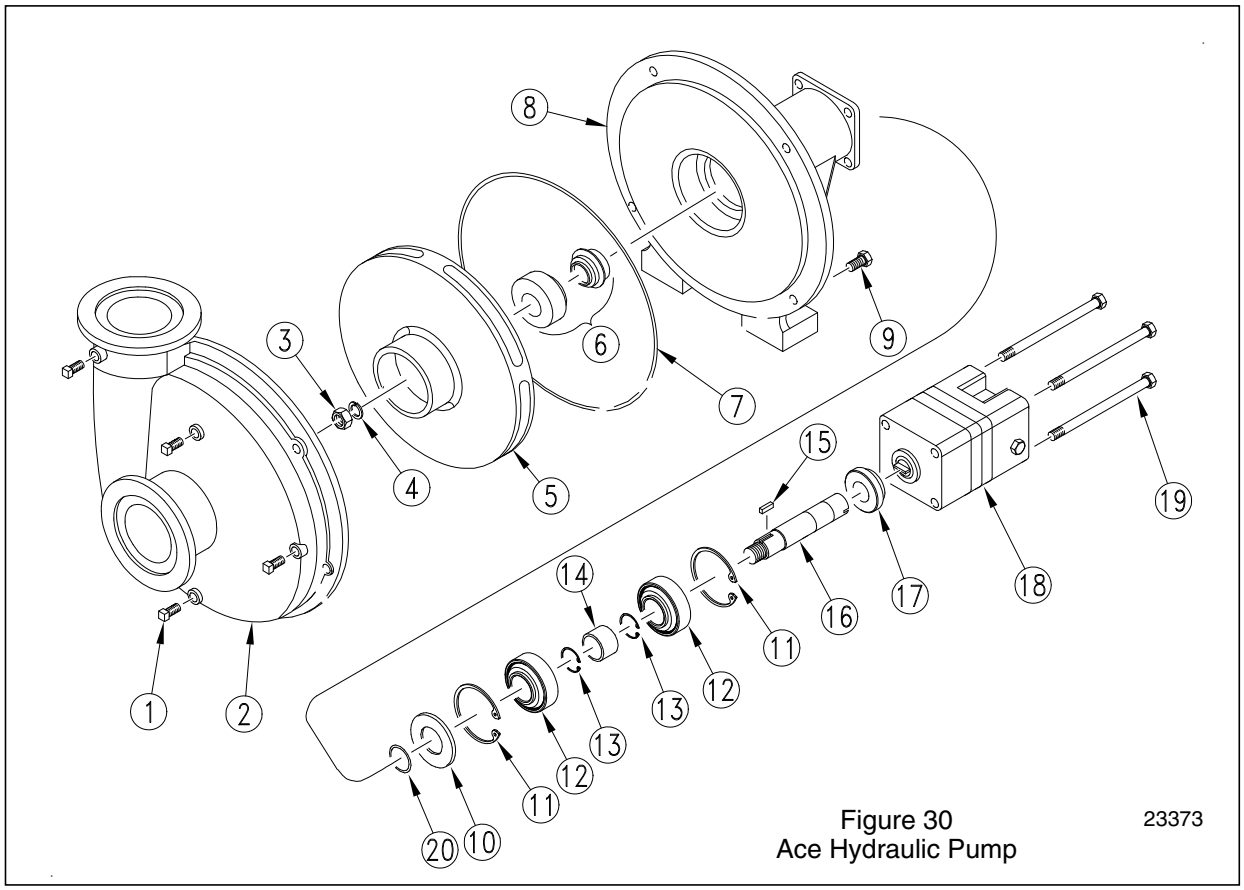


Figure 30
Ace Hydraulic Pump

23373

Ace Belt Drive Pump Seal Replacement

Refer to Figure 31

1. Loosen $4\frac{3}{8}$in x $\frac{3}{4}$in long hex screws ① which attach the pump volute ② to the mounting frame. Remove volute from mounting frame.
2. Remove impeller ③ from pump shaft. Use file or similar tool to unscrew in clockwise direction (left hand thread).
3. Ceramic rotating portion of the seal ④ may now be removed.
4. Using two screwdrivers inserted in mounting frame weep holes, pry non-rotating portion of the seal ⑤ toward the threaded part of the shaft and finish removing by hand.
5. If seal case is difficult to extract from the mounting frame seal bore, two screwdrivers may be used to further dislodge the seal.
6. Apply a small portion of non-hardening sealant to new seal case to assure good seal mounting frame bore. Insert case into bore.
7. Make sure non-rotating seal portion is properly seated by tapping lightly with suitable tool.
8. Place o-ring over pump shaft and slide downward. Oil face of new ceramic portion with light lubricating oil and place over o-ring and press downward to contact with the stationary portion.
9. Install impeller on shaft (left hand thread). Tighten by inserting a file or similar tool into impeller vane and turn counter-clockwise while holding shaft steady.
10. Replace gasket ⑥, volute, and four $4\frac{3}{8}$in x $\frac{3}{4}$in long hex screws.

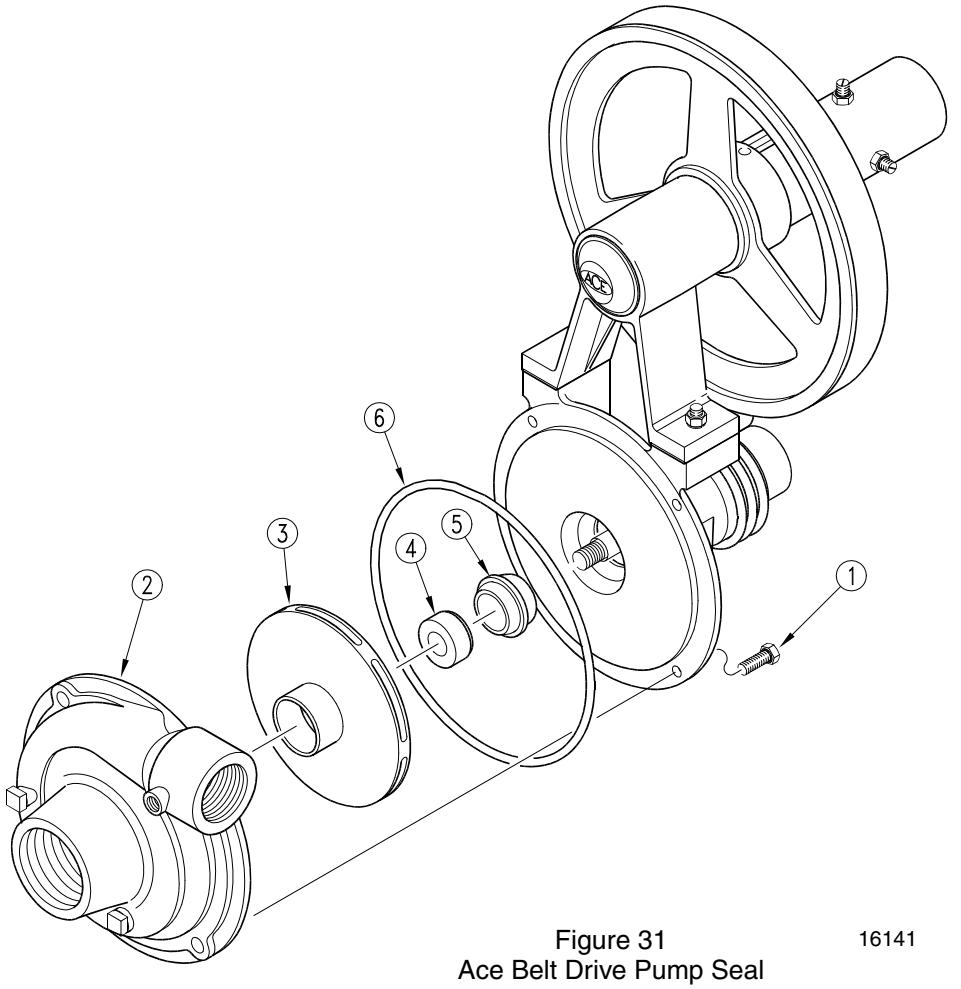
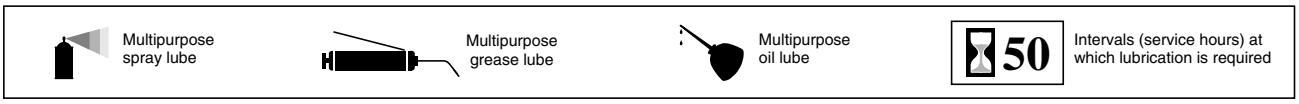
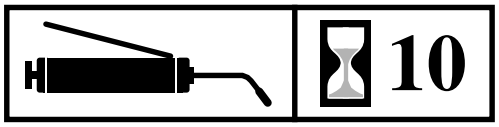


Figure 31
Ace Belt Drive Pump Seal

Lubrication

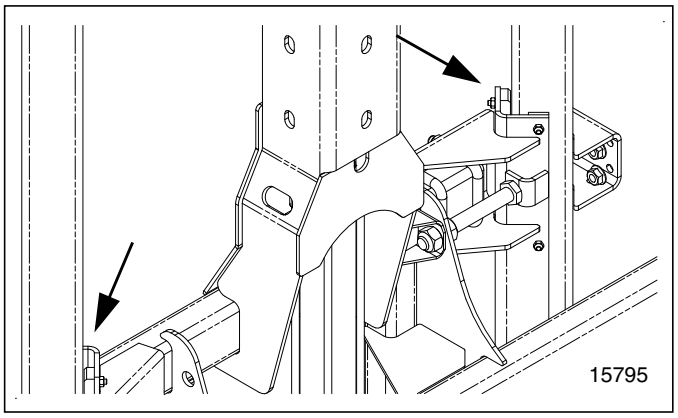


Elevator Slide: (if applicable)

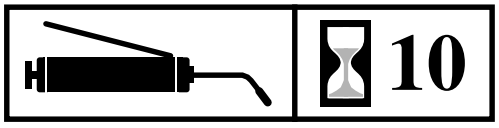


pads and exposed vertical tube bearing surfaces

Type of Lubrication: Dry graphite or NLGI grade 2 grease
Quantity: coat surface lightly

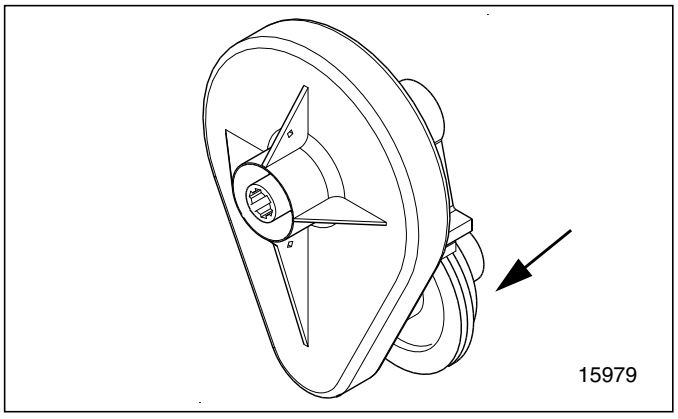


Ace Pump: (if applicable)

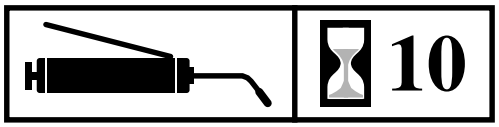


1 zerk
(located on belt idler arm casting)

Type of Lubrication: Grease
Quantity: 3 pumps

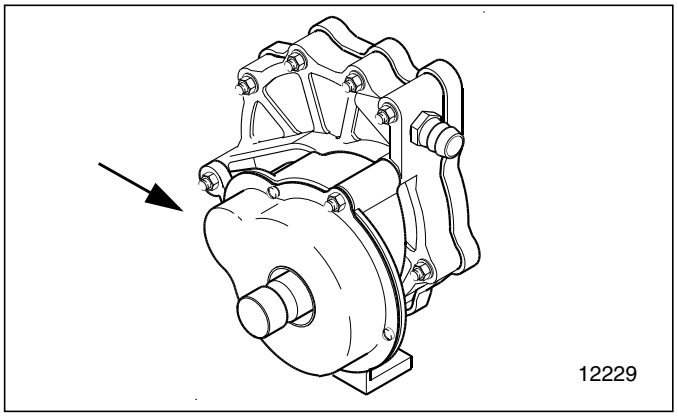


PTO Pump: (if applicable)



1 zerk
(located on rear gear case cover, and marked by decal)

Type of Lubrication: Grease
Quantity: 5 pumps



Options

Booms and Mounts

The standard 3P300 sprayer does not include booms. Booms are sold as separate products (not sprayer Option numbers). When ordered with a new sprayer, booms are pre-installed prior to delivery.

The 3P300 sprayer supports Great Plains CF500 (50-foot) and CF600 (60-foot) booms. The booms have Options for nozzle spacing.

Description	Boom Option	Part Number
CROSS FOLD 50 FT BOOM		CF500
WET BOOM KIT 20-50	(20)	509-271L
WET BOOM KIT 30-50	(30)	509-272L
CROSS FOLD 60 FT BOOM		CF600
WET BOOM KIT 20-60	(20)	509-269L
WET BOOM KIT 30-60	(30)	509-270L

If ordering a boom for a new or existing 3P300 sprayer, be sure to specify one of the following kits:

Description	Part Numbers
3P 300 FIXED MOUNT	501-570A
3P300 HYD HITCH	505-510A

Both mount kits include 2 sets of poppet-style QD fittings. The boom hoses otherwise are terminated with 9/16 FJIC connectors.

The 505-510A kit includes a hydraulic elevator.

For other boom Options, contact your Great Plains dealer or see the boom Operator manual.

Figure 32 12300
3P300 with Cross-Fold Booms

Calibration Accessories

Your boom includes a nozzle calculator and sample container. Export booms include a metric nozzle calculator.

Description	Part Numbers
CALIBRATION CONTAINER	817-199C
NOZZLE TIP CALCULATOR	832-038C
NOZZLE TIP CALCULATOR-METRIC	832-058C

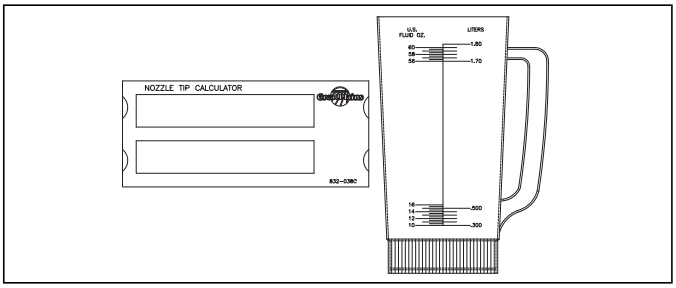


Figure 33 27165
Calibration Accessories

Chemical Inductor

The inductor eliminates the need to climb the walkboard and add materials directly to the tank water. It provides a convenient and safe dedicated ground-level 3-gallon (11.3 liter) tank.

If ordered with a new 3P300 (option #61), the inductor is pre-installed prior to delivery.

Description	Option	Part Number
3P300 CHEMICAL INDUCTOR ASY	(61)	502-161A

The inductor adds 38 lbs (17 kg) to the empty weight of the sprayer. When fully loaded with material, the inductor adds 83 lbs (38 kg) to the sprayer.

For use, see "**Chemical Inductor**" on page 52.

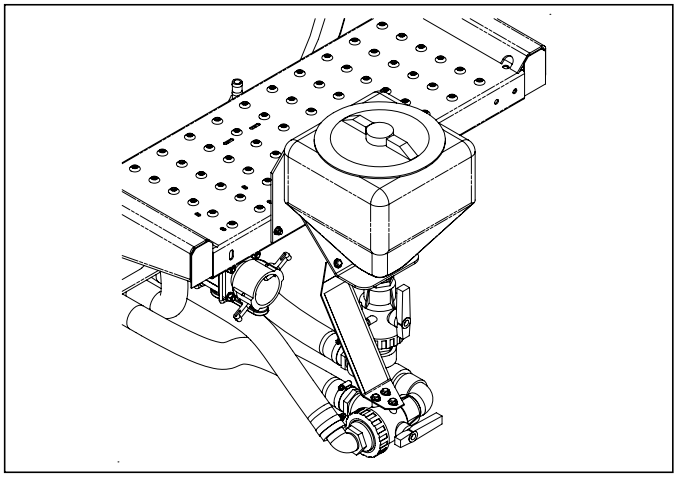


Figure 34 15804
Inductor

Controls

One of the following two remote control plumbing kits is required.

Auto Control Plumbing

This kit includes a Raven 440 controller, remote plumbing valves, pressure sensor and a flow meter. It provides:
+ an easy-to-read 28-character display
+ ground-speed-compensated automatic rate control
+ one-time easy programming
+ cumulative total volume & area
+ digital boom pressure display
+ low tank fault alarm
+ control valve delay
+ zero speed shutoff

It requires a connection to a speed sensor (see page 55).

If ordered with a new 3P300 (option #01), the sprayer-mounted components of this kit are pre-installed prior to delivery. Your dealer can assist with cab installation of the Raven.

Description	Part Numbers
3P300 AUTO CONTROL PLUMB ASSY	509-304A

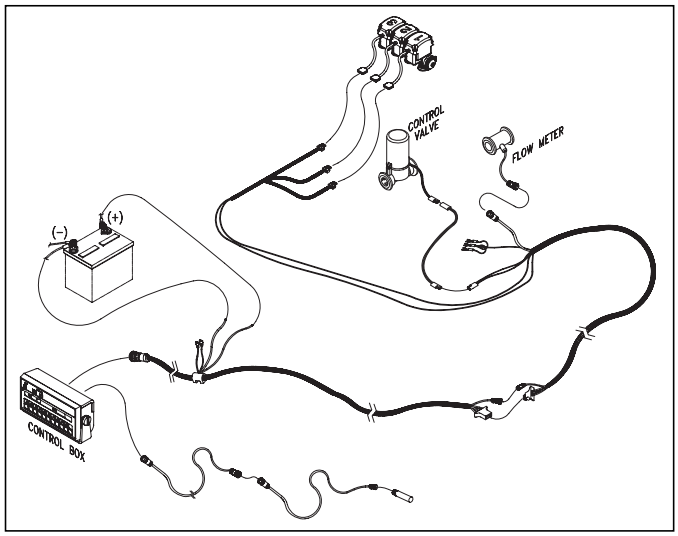


Figure 35 24094
Auto-Control System

Electro-Hydraulic Controller

The standard 3P300 sprayer boom cylinders include two sets of hydraulic hoses requiring two tractor circuits. The electro-hydraulic controllers combine the boom circuits, and the optional elevator circuit, into a single hydraulic circuit under tractor cab control.

Description	Part Numbers
ELEC/HYD KIT JOY STICK	506-584A
ELEC/HYD KIT SWITCH BOX	506-585A

Figure 36 99999
Electro-Hydraulic Controls

High Volume Foam Marker

This kit includes a 25 gallon tank with integral pump, mounting hardware, plumbing, nozzles and cab control. Dispensers are provided for both left and right booms.

If ordered with a new 3P300 (option #52), the foam marker tank is pre-installed prior to delivery.

Description	Option	Part Number
FOAM MARKER KIT 3P300	(52)	502-149A

The foam marker adds 114 lbs (52 kg) to the empty weight of the sprayer. When fully loaded, it adds 314 lbs (91 kg) to the sprayer.

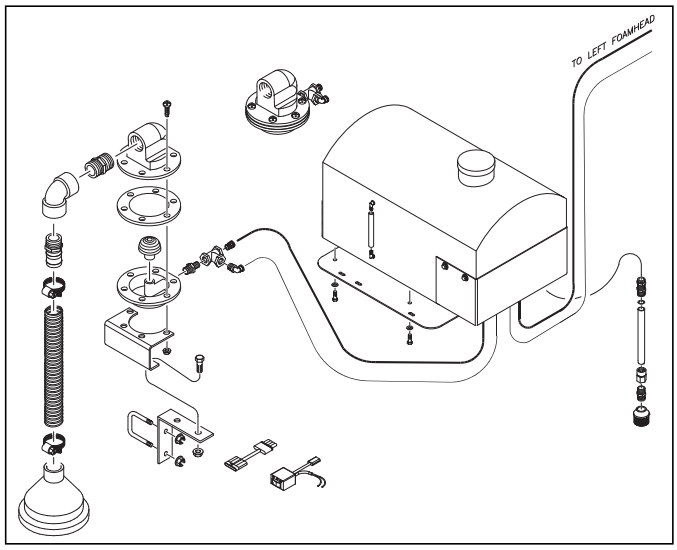


Figure 37 22703
Foam Marker System

Pumps

The standard 3P300 does not include a pump. Great Plains recommends using either a Great Plains PTO pump, or an Ace PTO or hydraulic pump.

Ace Pumps

Ace pumps are available for hydraulic power (#35, shown at right), high volume 540 rpm PTO (#36) or high volume 1000 rpm PTO (#37).

If ordered with a new 3P300 (see option #s above), the pump is pre-installed prior to delivery.

Description	Option	Part Numbers
PUMP 3P300 ACE HYD ASY	(35)	507-108A
PUMP 3PT ACE 540 HIGH VOLUME	(36)	507-077A
PUMP 3PT ACE 1000 HIGH VOLUME	(37)	507-078A

Pump kit weights:

507-108A 45 lbs (20 kg)
507-077A 83 lbs (38 kg)
507-078A 64 lbs (29 kg)

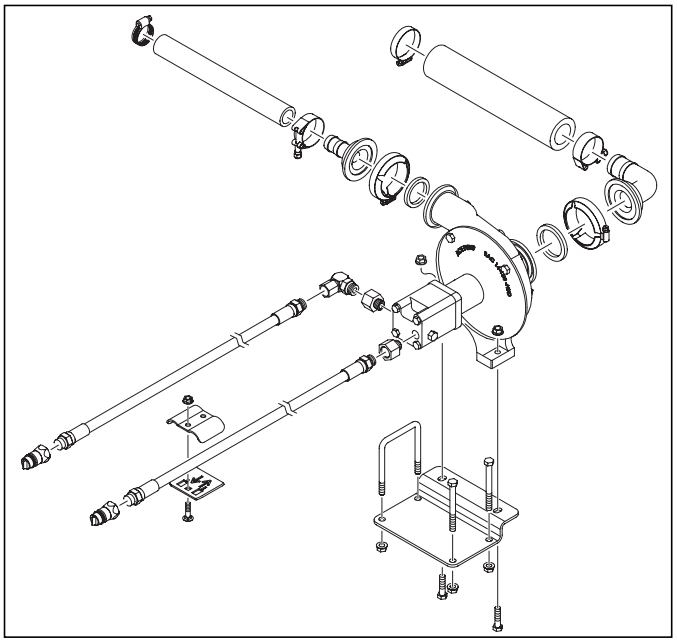


Figure 38 24090
Ace Hydraulic Pump

Ace Flow Limiter

On tractors with LOAD SENSING (LS) Closed Center hydraulic systems, this device limits the flow of oil to the Ace motor and prevents failures due to misapplication.

Your Great Plains dealer can assist with installation of the flow limiter.

Description	Part Numbers
FLOW LIMITER VALVE - ACE PUMP[a]	829-125C (2006-)
FLOW LIMITER VALVE- ACE LS206N[b]	829-131C (2007+)

a. For older pumps with ports on orthogonal faces.
b. For new pumps with both ports on same face (as shown in Figure 39).

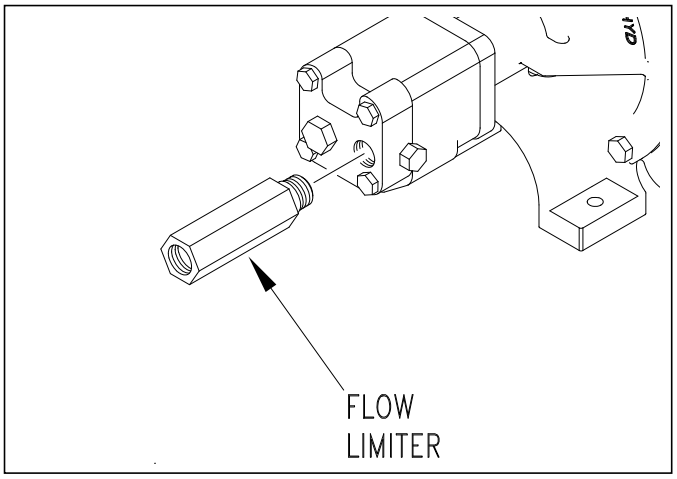


Figure 39 23395
Hydraulic Pump Flow Limiter

For use, see "**Ace Pump Flow Limiter (Optional)**" on page 20.

Great Plains PTO Pumps

Pumps are available for:
540 rpm PTO (#31)
1000 rpm $1\frac{3}{8}$in PTO (#32)

If ordered with a new 3P300 (see option #s above), the pump is pre-installed prior to delivery.

Description	Option	Part Numbers
PUMP 3-POINT 540 ASSY	(31)	507-051A
PUMP 3-POINT 1000 1-3/8 ASSY	(32)	507-052A

Pump kit weights:

507-051A 23 lbs (10 kg)
507-052A 22 lbs (10 kg)

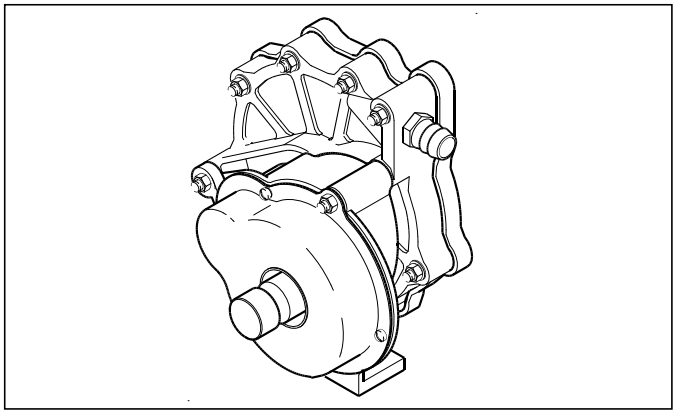


Figure 40 12229
Great Plains PTO Pump

Speed Sensors

The standard 3P300 does not include a speed sensor, which is required by the Auto-Control system to regulate material rate based on current speed. Optional sensors kits detect speed via wheel rotation or radar ground speed.

If the tractor already has a speed sensor, a “Y” cable is available to share its signal with the Raven 440 controller.

Radar Speed Sensor

This easy-to-install precision sensor may be mounted on either the tractor or the sprayer. It is compatible with a wide variety of agricultural cab controls, and may be used for implements other than the 3P300 when not spraying.

Your Great Plains dealer can assist you with installation.

Description	Option	Part Number
TSF RADAR KIT	(43)	509-289A

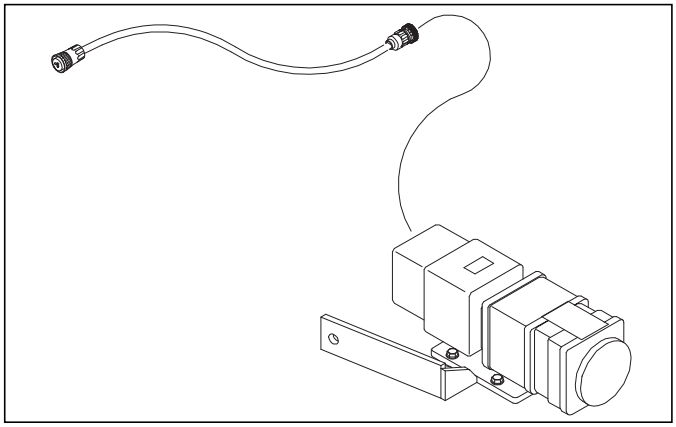


Figure 41 27153
Radar Speed Sensor

Raven Wheel Speed Sensor

This economical speed sensor must be tractor-mounted, may require hole drilling, and may be incompatible with some tractors. Consult your dealer.

Your Great Plains dealer can assist you with installation.

Description	Option	Part Number
RAVEN WHEEL DRIVE SENSOR	(42)	823-087C

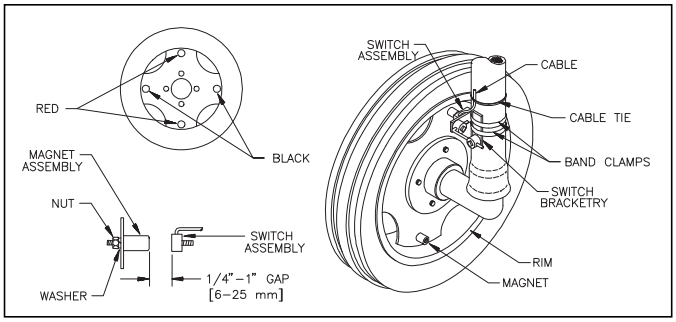


Figure 42 27154
Wheel Speed Sensor

Y-Cable

If your tractor already has a speed sensor, it may be compatible with the Raven 440 controller. Consult your dealer for advice.

If the sensor is compatible, these cables share the signal between your existing tractor systems and the Raven 440.

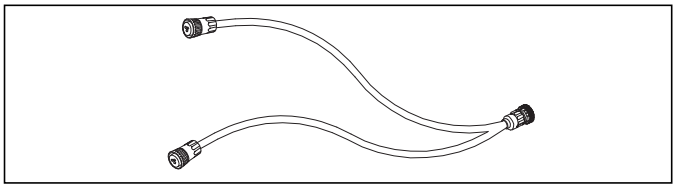


Figure 43 27155
Speed Sensor Y-Cable

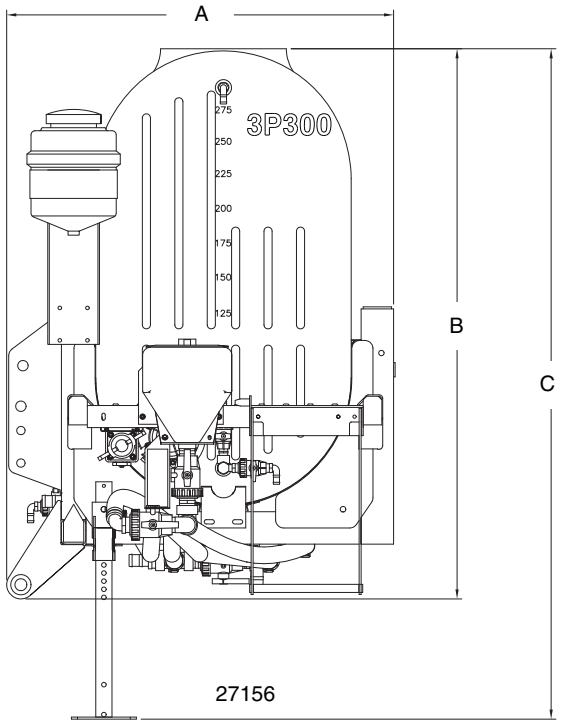
Part Numbers	Comment
115-0159-432	TRW radar, Case IH
115-0159-519	DICKEY-john or Magnavox radar, John Deere 1990 or later
115-0159-518	DICKEY-john radar, Cat Challenger (Model 65 & 75)
115-0159-517	DICKEY-john radar, Case IH
115-0159-529	DICKEY-john radar, Ford/White
115-0159-627	DICKEY-john radar, Cat Challenger (Model 65C, 75C-Mod, D-Mod Row Crop 35,45,55)
115-0159-700	DICKEY-john or Magnavox radar, John Deere 7000/8000/9000 Series (2WD or MFWD)
117-0159-462	Magnavox radar, other than John Deere
117-0159-463	TRW radar, other than Case IH

Appendix

Specifications and Capacities

Tank Size	300 Gallon - Polyethylene
Boom Widths Available	CF500: 50 feet (15.2m) CF600: 60 feet (18.3m)
Nozzle Spacing	20in (51cm) and 30in (76cm)
Weight	620-855 lbs (281-388 kg) empty, without boom (higher figure is w/all Options) 1716-1951 lbs (778-885 kg) empty, with CF500 boom 1761-1996 lbs (799-905 kg) empty, with CF600 boom
Frame Materials	3in x 3in and 3in x 4in steel tubing
Transport Width	Hydraulic fold booms 153in (3.9m)
Tractor Requirements	
Electrical System	12-volt, negative ground
Hydraulic System	For hydraulic pump, one hydraulic remote that can restrict flow to 6 gpm[a]. For hydraulic elevator and hydraulic pump used in combination, two hydraulic remotes.
Lift Capacity	5500 lbs at 24in (61cm) behind lower lift-arm balls
Pumps	Tractor mounted PTO pump - 540 RPM Tractor mounted PTO pump - 1000 RPM $1\frac{3}{8}$in spline Hydraulic pump Tractor mounted high volume PTO pump - 540 RPM Tractor mounted high volume PTO pump - 1000 RPM $1\frac{3}{8}$in spline

a. If tractor cannot restrict flow to 6 gpm, purchase a flow-control kit from your Great Plains dealer.



A $47\frac{11}{16}$in (121.1 cm)

B $67\frac{13}{16}$in (172.2 cm)

C $82\frac{5}{8}$in (209.9 cm)

Torque Values

Bolt Size	Bolt Head Identification					
	Grade 2		Grade 5		Grade 8	
in-tpi[1]	N-m[2]	ft-lb[3]	N-m	ft-lb	N-m	ft-lb
1/4-20	7.4	5.6	11	8	16	12
1/4-28	8.5	6	13	10	18	14
5/16-18	15	11	24	17	33	25
5/16-24	17	13	26	19	37	27
3/8-16	27	20	42	31	59	44
3/8-24	31	22	47	35	67	49
7/16-14	43	32	67	49	95	70
7/16-20	49	36	75	55	105	78
1/2-13	66	49	105	76	145	105
1/2-20	75	55	115	85	165	120
9/16-12	95	70	150	110	210	155
9/16-18	105	79	165	120	235	170
5/8-11	130	97	205	150	285	210
5/8-18	150	110	230	170	325	240
3/4-10	235	170	360	265	510	375
3/4-16	260	190	405	295	570	420
7/8-9	225	165	585	430	820	605
7/8-14	250	185	640	475	905	670
1-8	340	250	875	645	1230	910
1-12	370	275	955	705	1350	995
1 1/8-7	480	355	1080	795	1750	1290
1 1/8-12	540	395	1210	890	1960	1440
1 1/4-7	680	500	1520	1120	2460	1820
1 1/4-12	750	555	1680	1240	2730	2010
1 3/8-6	890	655	1990	1470	3230	2380
1 3/8-12	1010	745	2270	1670	3680	2710
1 1/2-6	1180	870	2640	1950	4290	3160
1 1/2-12	1330	980	2970	2190	4820	3560

Bolt Size	Bolt Head Identification					
	5.8 Class 5.8		8.8 Class 8.8		10.9 Class 10.9	
mm x pitch[4]	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb
M 5 X 0.8	4	3	6	5	9	7
M 6 X 1	7	5	11	8	15	11
M 8 X 1.25	17	12	26	19	36	27
M 8 X 1	18	13	28	21	39	29
M10 X 1.5	33	24	52	39	72	53
M10 X 0.75	39	29	61	45	85	62
M12 X 1.75	58	42	91	67	125	93
M12 X 1.5	60	44	95	70	130	97
M12 X 1	90	66	105	77	145	105
M14 X 2	92	68	145	105	200	150
M14 X 1.5	99	73	155	115	215	160
M16 X 2	145	105	225	165	315	230
M16 X 1.5	155	115	240	180	335	245
M18 X 2.5	195	145	310	230	405	300
M18 X 1.5	220	165	350	260	485	355
M20 X 2.5	280	205	440	325	610	450
M20 X 1.5	310	230	650	480	900	665
M24 X 3	480	355	760	560	1050	780
M24 X 2	525	390	830	610	1150	845
M30 X 3.5	960	705	1510	1120	2100	1550
M30 X 2	1060	785	1680	1240	2320	1710
M36 X 3.5	1730	1270	2650	1950	3660	2700
M36 X 2	1880	1380	2960	2190	4100	3220

1. in-tpi = nominal thread diameter in inches-threads per inch
2. N· m = newton-meters
3. ft-lb = foot pounds
4. mm x pitch = nominal thread diameter in millimeters x thread pitch

Torque tolerance + 0%, -15% of torquing values. Unless otherwise specified use torque values listed above.

Warranty

Great Plains Manufacturing, Incorporated warrants to the original purchaser that this spraying equipment will be free from defects in material and workmanship for a period of one year from the date of original purchase when used as intended and under normal service and conditions for personal use; 90 days for commercial or rental purposes. This Warranty is limited to the replacement of any defective part by Great Plains Manufacturing, Incorporated and the installation by the dealer of any such replacement part. Great Plains reserves the right to inspect any equipment or part which are claimed to have been defective in material or workmanship.

This Warranty does not apply to any part or product which in Great Plains' judgement shall have been misused or damaged by accident or lack of normal maintenance or care, or which has been repaired or altered in a way which adversely affects its performance or reliability, or which has been used for a purpose for which the product is not designed. This Warranty shall not apply if the product is towed at a speed in excess of 20 miles per hour.

Claims under this Warranty must be made to the dealer which originally sold the product and all warranty adjustments must by made through such dealer. Great Plains reserves the right to make changes in materials or design of the product at any time without notice.

This Warranty shall not be interpreted to render Great Plains liable for damages of any kind, direct, consequential, or contingent, to property. Furthermore, Great Plains shall not be liable for damages resulting from any cause beyond its reasonable control. This Warranty does not extend to loss of crops, losses caused by harvest delays or any expense or loss for labor, supplies, rental machinery or for any other reason.

No other warranty of any kind whatsoever, express or implied, is made with respect to this sale; and all implied warranties of merchantability and fitness for a particular purpose which exceed the obligations set forth in this written warranty are hereby disclaimed and excluded from this sale.

This Warranty is not valid unless registered with Great Plains Manufacturing, Incorporated within 10 days from the date of original purchase.

Index

Symbols

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